SCIENCE AND DECOLONISATION

By

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WHAT DOES DECOLONISATION HAVE TO DO WITH SCIENCE?

The #RhodesMustFall and #FeesMustFall student protests of 2015 and 2016 resulted in widespread calls by students to decolonise South African universities. Students called for a more inclusive university environment, curriculum transformation and removal of financial barriers to education. There was also a more specific call to decolonise science. As a young scientist in South Africa, you should understand how colonisation has influenced science. In this chapter, we present a perspective on what decolonisation is, and how UCT and science are being decolonised.

#RhodesMustFall and #FeesMustFall were student-led political movements at South African universities in 2015 and 2016.

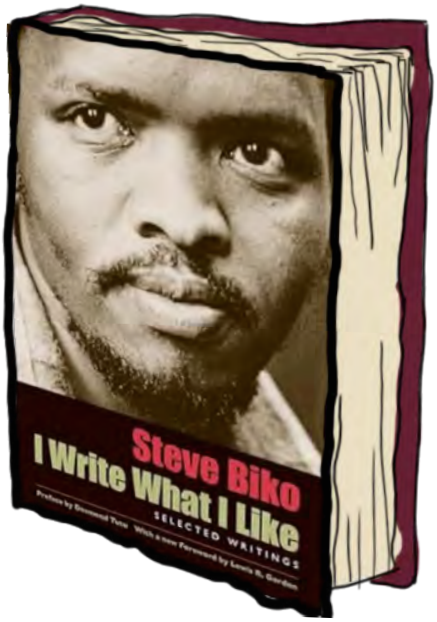
WHAT IS DECOLONISATION?

Colonisation is the process by which a nation takes control of land belonging to other nations, in order to exploit the land and its resources. In this process, the colonial power exerts political, economic and cultural dominance over the local population. Colonisation has happened across the world over the course of history and continues to take place, but South Africa has been most affected by the colonisation of Africa by European nations.

Decolonisation seeks to undo the oppressive legacy of colonisation. In Africa, decolonisation originally referred to countries achieving independence and becoming self-governing. The eradication of colonialism was a central principle of the Organisation of African Unity, which was formed in 1963 and replaced by the African Union in 2002.

Today, decolonisation is understood as an umbrella term for diverse efforts to challenge oppressive political, economic and cultural systems (such as white supremacy, apartheid, patriarchy and capitalism) that perpetuate the oppression of marginalised groups (such as people of colour, women and queer people). Decolonisation seeks to dismantle dominant, exclusionary European values and make way for local philosophy and traditions that were disregarded by colonisers [1]. Decolonisation in South Africa calls for economic emancipation for all South Africans, as a means of achieving true emancipation post-apartheid. The aim of decolonisation in South Africa is to restructure society to reflect African identities and ways of being, whilst striving to create a country that is more equal, more equitable, more just and inclusive of all living beings [2].

Many scholars and activists agree that decolonisation includes decolonising the mind from the psychological oppression of colonialism. Steve Biko's work, along with Mamphela Ramphele and Barney Pityana, gave rise to the Black Consciousness Movement in the 1970s, which sought to awaken the self-worth of Black communities living under colonisation and apartheid [3]. A core principle of the Black Consciousness Movement was an understanding that true liberation and decolonisation are not



possible without an initial psychological transformation. This movement encouraged Black South Africans to take back their power by unlearning the harmful stereotypes that they had been forced to accept about themselves, and to start believing in their own value and the value of their cultures and traditions.

If you're thinking that this sounds a bit too philosophical and doesn't quite make sense, you are not alone. For many people, especially us scientists, decolonisation can be a tricky concept to understand. Regardless of which definition of decolonisation resonates with you most, it is important to acknowledge our country's oppressive past (both under colonisation and apartheid) and to seek ways to reduce the harmful impacts of past regimes.

Pause to ponder

Think about your understanding of decolonisation. What aspects of science do you think decolonisation should focus on in South Africa?

DECOLONISATION AT UCT

UCT has a long history of activism. From the 1950s onwards, UCT students and staff organised many protests and sit-ins to oppose the apartheid government's racist laws and limitations on academic freedom. UCT also allowed black students to attend classes and live in student residences, in defiance of the Group Areas Act. However, UCT is also described as having had 'two faces' under apartheid: while UCT publicly opposed apartheid, black students and staff still faced discrimination on campus [4]. Since democracy

in 1994, UCT has been on a transformation journey to make the institution more inclusive and reflective of South Africa as a diverse nation, but has faced criticism for not prioritising this change.

On 9 March 2015, Chumani Maxwele, a UCT political science student, threw a bucket of faeces over the statue of Cecil John Rhodes, which was located on the stairs leading up to the plaza in front of Sarah Baartman Hall. This iconic moment ignited the #RhodesMustFall movement that spread across South Africa. UCT removed the statue a month later. From October 2015, students across South Africa contested excessive fee increases in the #FeesMustFall protests, which ultimately led to increased NSFAS funding. These Fallist movements sparked renewed calls for the decolonisation of the institution. Since then, UCT has pursued transformation more vigorously.

My story

My experience of the Fallist movement at UCT

Akha Tutu
UCT Humanities graduate

I am an aspiring linguistics scholar who is staunchly decolonial in my approach to studying language, with a focus on South African languages and a particular interest in isiXhosa. The Fallist movement at UCT started in 2015 when I was an undergraduate student in the Humanities Faculty. The movement was powerful and dangerous because it dared to speak back to the colonial empire and the neo-imperial project that has oppressed (and continues to oppress) so many Black and Brown people across the world.

This movement, started by mere students – Black students, poor students, queer students – was so powerful that it found voice and expression

across the entire world. But the Fallist movement was also not perfect and definitely not free from criticism. Due to the fact that the movement was addressing difficult issues of our society and the UCT community, it was not always a kind space to different people. In fact, it was often emotionally charged and riddled with competing interests and ideas. This often resulted in many people feeling unwelcome and unwanted, which was sometimes deliberate. But this intentionality sometimes worked because it was used as a tool to create spaces for marginalised groups in which they could speak about their issues freely.

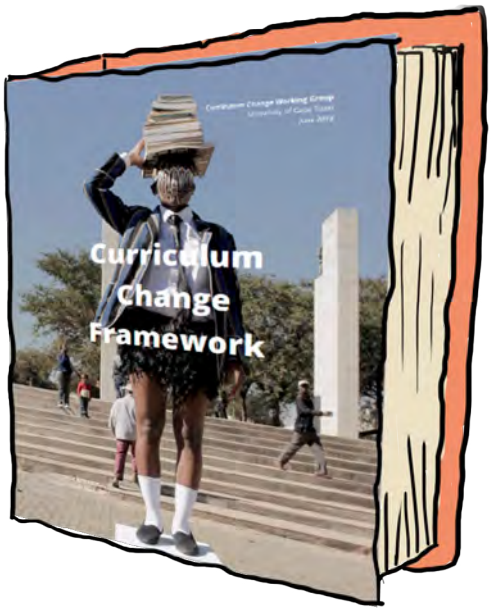
The Fallist movement also opened my eyes to the concept of intersectionality, where I could understand the link between my different identities – as a Black man, a South African man, and as a gay man. This theory validated me in all of who I am and drove the point that I belong in this university. Finally, after spending my entire life feeling like I was less than, like I did not belong, I was able to truly see myself – and I was proud!

Pause to ponder

Encountering these topics for the first time can be tough! Not only are many of these concepts deeply theoretical; they also bring up our own unresolved emotions – feelings of pain, anger, guilt and hurt. If you are feeling a little overwhelmed, know that this is normal and perfectly okay. To help with processing your feelings, write down some thoughts about how you are feeling right now.

In 2016, the UCT Vice-Chancellor set up task teams to respond to the issues raised by protesting students. One such task team was the Curriculum Change Working Group, which facilitated dialogue about decolonising the curriculum. This working group

published the *Curriculum Change Framework* in 2018, which drew on decolonial scholars from Latin America and Africa to identify four persistent aspects of colonialism:



- Coloniality of power (the asymmetrical power relations between Europe-America and the rest of the world).
- Coloniality of being (dehumanisation of colonised people).
- Coloniality of knowledge (colonial norms regarding what is valued as knowledge, who gets privileged as a knower and whose interests dominate).
- Coloniality of doing (colonised people copy the oppressor, thus perpetuating colonial ways of doing).

In 2021, UCT launched *Vision 2030*, which calls for institutional transformation to 'unleash human potential to create a fair and just society'. Every academic department is now required to submit an annual transformation report. The Office for Inclusivity and Change (OIC) was established to support transformation and inclusion, and provide support to survivors of gender-based violence. UCT has an Employment Equity Plan, and policies on mental health, HIV/AIDS, sexual harassment, disability, inclusivity around sexual orientation, and anti-racism. The transformation process is ongoing, but milestones in recent years include:

- Renaming Jameson Hall to Sarah Baartman Hall.
- Re-curating artworks across campus to be more inclusive and diverse.
- Ongoing curriculum change processes in all faculties.

- Courses on the Khoekhoegowab language and South African Sign Language.
- The new 'Towards a Decolonised Science in South Africa' course.
- A food security programme for students.

The need for these changes arises from UCT's colonial origins, reflected in UCT's building names, artworks and curriculum. UCT was modelled on elitist European universities, in its architecture, its organisation into faculties and disciplines, and its ethos of competition and individual achievement. Although decolonial collaborative and transdisciplinary approaches are valued in principle, these are difficult to implement because of the way the institution is organised.

Furthermore, the need for a food programme reflects the colonial and apartheid legacy of deep economic inequality. As the #FeesMustFall protests highlighted, high university fees (unlike some countries), along with other costs associated with studying, make it harder for poor students (who are usually Black) to succeed in their studies. This unfair situation is often referred to as 'structural' discrimination. At the same time, discrimination (often unconscious) still impacts students of colour, particularly Black women. Thus, despite the progress made, the 'two faces' of UCT continue to be a reality. The Science Faculty's Deputy Dean for Transformation, Prof. Sarah Fawcett, describes the Science Faculty's response.

Specialist perspective

Transformation in the Science Faculty

A/Prof. Sarah Fawcett
Science Faculty Deputy Dean for Transformation

Did you know that the Faculty of Science at UCT has a Deputy Dean for Transformation? This position was established in response to growing recognition of the need for systemic transformation in South African higher education, particularly in the wake of the #RhodesMustFall movement.

The Deputy Dean for Transformation is an ordinary academic who also teaches and supervises students and does research. As the current holder of this position, I take very seriously my responsibility to ensure that factors such as race, gender, socioeconomic status and ability are properly considered in every action that the Science Faculty takes. I also chair the Science Faculty's Transformation Committee, which includes academics and support staff from all departments, as well as undergraduate and postgraduate student representatives. UCT's legacy in the transformation space is complex and difficult, marked by the enduring impact of apartheid and the ongoing struggle to address deep inequalities that persist in higher education and society. The Transformation Committee must spearhead efforts to redress these inequalities, including by promoting the recruitment and retention of students and staff from historically underrepresented groups and ensuring that curricula are reflective of diverse perspectives.

To give you an example, we are currently piloting an initiative to provide opportunities for undergraduate students from historically underrepresented groups to work as paid research assistants in laboratories across the faculty. In 2024, we funded 20 such research assistantships, which were focused on a diversity of topics from climate risk to drug development. Our hope is that, by

providing such opportunities to students who may not otherwise approach a professor to ask about research openings in their lab, we will attract a greater diversity of students into our postgraduate programmes. To me, this research assistantship programme sums up the role of the Deputy Dean for Transformation – to work to remove barriers to opportunity where such barriers used to, or continue to, exist. In the end, it's about driving a fundamental rethinking of what a modern and inclusive science faculty should be.

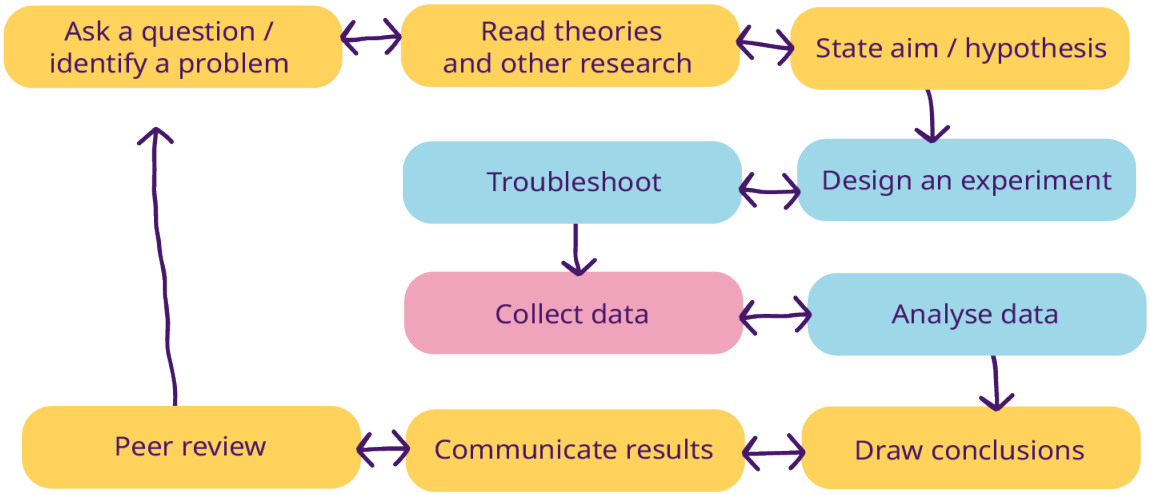
QUESTIONING OUR ASSUMPTIONS

During the #RhodesMustFall protests, students called for the decolonisation of science, which led to a series of open engagements in the Science Faculty, where staff and students debated what this means. Decolonising science doesn't mean abandoning science knowledge: we will still use Newton's laws, the structure of the atom and the theory of evolution because these ideas are powerful explanatory tools. Rather, decolonising science involves first questioning our assumptions about science and then considering how we want to teach and do science in the future, so that science can contribute meaningfully to society. The colonial view of science can be characterised as: (1) science and scientists are objective; (2) science is the best knowledge system; and (3) science was invented by European men. In this section, we examine each of these three assumptions.

How objective is science?

Is science really objective? As you already know, science is both a process and a body of knowledge. The process involves systematically acquiring knowledge through observation, experimentation and logical reasoning. Scientists develop theories and models that can explain and predict aspects of the physical world. The scientific method (Figure 1) is used by experimental scientists, as well as by engineers and social scientists (such as psychologists and sociologists). Most MSc and science PhD research projects, as well as many undergraduate labs, use this method. Many scientists believe that objective truth can be revealed through the rigorous implementation of this method.

Figure 1: The scientific method



However, scientists' unconscious biases influence the science they produce. Although the *data* is objective (insofar as it is reproducible by other scientists who use the same methods), the *questions* asked, the experimental and analytical *methods* selected, and the *conclusions* drawn are affected by the culture, beliefs and biases of

the scientists themselves. Science is conducted by humans (often working in large teams), with every step of the scientific method influenced by our brilliance and our flaws. *Who* does the science has a profound influence on the end result.

Is science the best knowledge system?

Having looked at the objectivity of science, the next question we consider is whether science really is the best knowledge system. There are many other 'ways of knowing' for making meaning of the complexity of reality, including indigenous knowledge systems (IKS), the creative arts and religion. Each of these knowledge systems have different authorities and strategies, as Table 1 shows.

When an elder dies, a library burns to the ground. *(Twi proverb)*

Table 1: Examples of knowledge systems

Knowledge system	Who are the knowledge authorities?	How is knowledge shared?	How is knowledge verified?
Science	Scientists	Conferences, journal articles, books	Experiments, peer review
Indigenous knowledge systems (IKS)	Traditional healers, elders, ancestors	Oral tradition, apprenticeship, dreams	Experimentation (trial-and-error testing of treatments)
Creative Arts	Artists, musicians, dancers, writers etc	Exhibitions, performances	Personal experience
Religion	Religious leaders	Religious services, books	Religious texts (e.g. Bible, Quran, Bhagavad Gita), personal experience

Research shows that people have different views about the relationship between different knowledge systems [5, 6]. These different views are as follows:

- **Independent:** Different knowledge systems deal with different kinds of knowledge and are useful in different aspects of our lives. Science provides knowledge of the physical world; religion and IKS provide moral guidance; the arts enrich our lives by touching us emotionally.
- **Integrated:** Different knowledge systems are all part of the same truth. Whereas science offers 'bottom-up' (reductionist) explanations, religion and IKS offer 'top-down' (teleological) explanations, and the arts connect to our intuition (a form of knowing that isn't based on rational explanations). STEAM education is an integrationist approach that inserts the arts into science, technology, engineering and mathematics (STEM) education.
- **Conflicting:** Different knowledge systems make rival statements about the same domain, so a person must choose between them (e.g. a person must choose between evolution and creationism).
- **Intersecting:** Different knowledge systems intersect: they agree in some aspects but have different approaches to other aspects.
- **Dialoguing:** It is constructive to engage in dialogue between different knowledge systems (e.g. exploring similarities between the practical knowledge and methods of science and IKS).

Which description best fits your view?

None of these views is inherently wrong. We need different knowledge systems to help us negotiate the complexity of reality. Science is useful in many ways, but that doesn't mean it's a superior system for all of our needs. You can think of different knowledge systems as different languages for thinking and for being in the world. As an example, Andrea Ross-Gillespie describes her integrationist understanding of the relationship between science and religion.

My story

Science tries to answer the *how*, religion is the *why*

Dr Andrea Ross-Gillespie
PhD in Applied Maths

I've never had conflict in my mind with science and religion. My dad is a pastor in the Lutheran church, but has always been very open minded and willing to discuss and debate. He explained to me that the first two chapters of the Bible, which tell two stories of creation, are written in 'story' language and aren't meant to be a scientific documentation of what happened. In fact, in the two chapters the order of creation is different. This contradiction is to me an indication that the story of creation wasn't meant to be taken as a factual account of the events – the purpose is to proclaim *that* God created the world, not exactly *how*. The theory of evolution doesn't detract from God's power and awesomeness – if that's the tool God used to create the world, it's a pretty amazing tool. I believe God created us curious and with a desire to explore the world, so humans coming up with theories to explain creation is all part of how we're created to be.

I like an analogy that Prof. John Lennox gives. If I ask you why a kettle is boiling, you could answer with explanations of thermodynamics. But you could also answer that the kettle is boiling because you want a cup of tea. Science and religion address two totally different aspects of how the world came to be – science tries to answer the *how*, religion is the *why*.

DECOLONISING THE HISTORY OF SCIENCE

Maybe you feel that history is boring and not for scientists! However, many scientists now think that science should not be conducted without understanding the history of science. We invite you to take a few minutes to read this section. You're in for some surprises...

The origin of science

If you were asked to give a brief history of 'western' science, what would you say? Based on your school knowledge, your answer might be located entirely in Europe, starting with the ancient Greek philosophers (e.g. Pythagoras, Democritus, Aristotle and Euclid) during the 6th – 3rd century BCE (Before the Current Era, i.e. before Jesus). In fact, the biggest centre of knowledge in this period was in Africa (not Europe!), at Alexandria's Great Library in Egypt, which had at least 40 000 handwritten scrolls.

When the Western Roman Empire declined in the 5th century CE (Current Era), scholars travelled east to Constantinople (now Istanbul in Turkey) and Baghdad (the capital of modern-day Iraq). In Baghdad, scholarship flourished during the Golden Age of Islam (8th to 13th centuries CE). It's in Baghdad that science really became science, when Greek philosophy came together with experimentation, a decent number system from India (instead of clunky Roman numerals), and Chinese books on geometry, optics, mechanics and logic. The red arrows in Figure 2 illustrate this trajectory.

The oldest records of the 'Pythagoras' theorem come from Africa (on an Egyptian papyrus) and Asia (on a Babylonian clay tablet), both from about 1900 BCE (1300 years before Pythagoras). Historians debate whether the philosopher Pythagoras actually contributed to mathematics at all.

Communities of scholars thrive under the right conditions.

Figure 2: The trajectory of 'western' science knowledge (6th century BCE – 15th century CE)

The purple arrows in Figure 2 show how this Muslim scientific knowledge then spread into Europe during the 11th to 13th centuries, through trade and the Crusades, and through Christian scholars travelling to Muslim cities to learn science. This knowledge also travelled through North Africa, which was part of the Islamic empire. When Constantinople fell in the 15th century, some scholars fled to Italy, which helped bring scientific knowledge into Europe's Renaissance.

The first word revealed in the Quran was 'Read' and reflects the emphasis on reading, studying and pursuing knowledge in the Islamic faith, which heavily influenced Muslim scholars.

We've been tricked into thinking that science was invented by European men by the way in which science textbooks are written. Our textbooks give credit to European men in the naming of laws, principles and methods, but omit the names of other people whose contributions are also important. For example, you probably haven't heard of Muḥammad ibn Mūsā al-Khwārizmī, even though the word 'algorithm' is derived from his surname and he coined the term for algebra (al-jabr). His method of solving quadratic equations is called 'completing the square' rather than

UCT's *Curriculum Change Framework* notes that the 'historicity or genealogy of disciplines and professions needs to be undertaken as serious scholarship in order to expose embedded lies and to help explain the character of the academy, demographics and those whose interests continue to be served at the expense of marginalised populations.' [7]

'al-Khwārizmī's method'. His book, *On the Calculation with Hindu Numerals*, brought Indian mathematics and numerals to Europe. In addition, some European attributions differ: Boyle's law is called Marriotte's law by the French, and German and French countries talk about the Lorentz force rather than Fleming's left-hand rule.

The entangled history of science and colonialism

As a budding scientist, you should also give some thought to the way that science and colonialism have been entangled historically. Science was often complicit in colonial endeavours, through the exploitation of resources, the marginalisation of IKS and the justification of colonial policies. As UCT's *Curriculum Change Framework* [7] points out, 'knowledge has often been used as a justification for oppression or as a tool to privilege some interests: for example the role of geologists and mining engineers in the development of the gold mining industry in South Africa; the role played by physicists in developing South Africa's atomic energy capacity under apartheid; the role archaeology, palaeontology, psychology and sociology had in racial classification and gender stereotypes; the role of physiology and anatomy in social Darwinism; the role of chemical engineering in perpetuating the fossil energy economy despite its destructive power.'

Some famous European male scientists were very much a product of their colonial times, with racist and sexist views that informed their science. Charles Darwin, often referred to as the 'father of evolutionary theory', held many views that were overtly racist and sexist. He thought of men as being 'more courageous, pugnacious, and energetic' than women and

predicted that 'At some future period, not very distant as measured by centuries, the civilized races of man will almost certainly exterminate and replace throughout the world the savage races.' George Cuvier, the founder of palaeontology, was openly racist He used his dissection of Sarah Baartman, a Khoi woman, to justify his ideas on racial evolution.

The scientific knowledge held within indigenous communities (especially those in Africa, South America and Australasia) has often been lost or destroyed as a direct result of colonisation. For example, the Spanish destroyed nearly all of the Maya's written records in South America. The knowledge of the Bokoni people in Mpumalanga has also not survived, although they had high levels of agricultural innovation and productivity, and were part of a trading system to the coast of Mozambique that connected with Indian Ocean trade routes to Asia and Europe. During the 16th – 18th centuries, the Bokoni built terraced fields and roads that connected over 10 000 km^2 of the escarpment [8].

The white Rhodesian government put pressure on archaeologists to claim that Great Zimbabwe (with its 11 m walls and 22 m tower built of stone without cement during the 11th – 15th centuries) was not constructed by Africans, but archaeologist Gertrude Caton-Thompson proved the government wrong with her meticulous research in 1929.

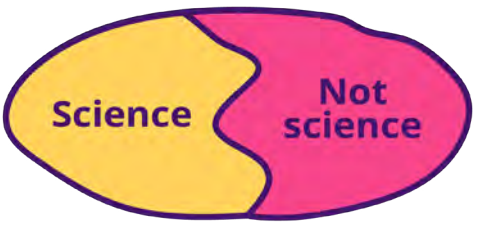
DECOLONISING THE FUTURE OF SCIENCE

Although science has a dark side, it still has much to offer the world. Good quality science uses rigorous methods to provide us with trustworthy knowledge about the physical world. This knowledge allows us to make valid predictions and evidence-based decisions. Although science was used to further colonialists' greedy agendas, science has also brought many benefits to humanity. Decolonised science has the potential to help solve the biggest problems facing our planet.

But what does decolonised science actually mean in practice? Decolonising science is a complex process that involves questioning assumptions about science knowledge and its production (as we've done in this chapter) and engaging in an ongoing effort to make science more inclusive and socially just. It means learning and conducting science in ways that acknowledges the realities of colonisation, whilst still embracing the core principles and rigour of the scientific method. In this final section, we explore three aspects of decolonising science in practice: interrogating what counts as science, decolonising the science curriculum, and decolonising scientific research.

What counts as science?

How do we decide where the boundary of science lies? If we define science as practical knowledge of the natural world and a process by which people systematically acquire knowledge about the physical world through observation, experimentation and logical reasoning, then we should broaden the boundaries of science to include knowledge and practices that are not part of 'western' science. Science is embedded in traditional African techniques for the extraction of metals and the preparation of herbal medicines, alcoholic beverages and foods such as cassava. However, the practitioners may not understand their practice through the models of western science, but instead through other knowledge systems that are linked to cultural beliefs. The reality that all science (including 'western' science) is shaped by the culture that it sits in.



The earliest evidence of mineral processing is a 100 000-year-old ochre-pigment workshop at Blombos Cave, 300 km from Cape Town.

In general, indigenous people have not been acknowledged for their contributions to science, even though these have been substantial, particularly in regard to

medicinal plants. One exception to this lack of acknowledgement is the Mpemba effect, which is named after the Tanzanian schoolboy who shared his observation with a scientist.

We may not agree just where the boundary of science lies, but it's important to realise that the boundary can be contested. Do we need the full manifestation of the scientific method, or are elements of the scientific method enough? If knowledge is verifiable by the scientific method, does it count as science? Who are the gatekeepers, and whose interests are served by the gatekeepers? In thinking about the boundary of science, we should also acknowledge how diverse the sciences are: there is considerable variation in how the scientific method is practised across the different science disciplines.

Decolonising the science curriculum

In September 2019, after staff and students had responded to the *Curriculum Change Framework*, UCT's Senate approved principles for decolonising the curriculum [9], which we describe here. Curriculum design should start with 'graduate attributes', i.e. the desired knowledge, competencies, values and skills (including research skills) that UCT students should acquire through their UCT experience. Departments should ask 'to what extent do we require graduates to have engaged with challenges of social justice, inequality, poverty, social and economic exclusions and historical marginalisation of people, through their programmes of study? Lecturers should not only induct students into specialised knowledge, but also engage students in how this specialised knowledge 'relates to national, African and global contexts'.

Gold was mined in Mapungubwe (Limpopo) during the 11th – 13th centuries and Great Zimbabwe during the 13th – 15th centuries. (One woman was buried in Mapungubwe with over 100 gold bangles and 1 000 gold beads!)

UCT's Prof. Shadreck Chirikure combines archaeology with chemistry to recover some of the pyrotechnology used in Mapungubwe and Great Zimbabwe.

The Senate principles call for lecturers to be 'critically self-reflective of which texts and voices are privileged and which are silenced or marginalised in the curriculum'. This means paying attention to the content and authorship of textbooks. Is the content appropriate for our local context? The high cost of textbooks is an aspect of structural discrimination against poor students. UCT encourages staff to create open educational resources, i.e. digital textbooks and other resources that are available free to everyone. UCT's Digital Open Textbooks for Development (DOT4D) initiative supports lecturers who work with their students to create open textbooks with locally relevant content. These textbooks are openly licensed so that others (within and beyond UCT) may re-use, translate and adapt them for their local context, without payment or copyright constraint. To date, over 40 textbooks have been written by UCT staff and students, including Prof. Maria Keet's computer science textbook [10] and *Science is Tough (But So Are You!)*. Currently, some UCT maths lecturers are writing a book about teaching maths.

The Senate principles also require that we address 'the historic relationship between knowledge and power' in our disciplines. This includes acknowledging the Eurocentric naming of universal principles and methods, and the biases of famous scientists. Whilst it would be scientifically wasteful to discard their findings, it's unethical to teach their work without acknowledging how they contributed to the marginalisation of certain groups.

Apart from curriculum content, the curriculum review process should also examine pedagogy (teaching methods) and assessment methods. In addition, students should 'continue to play a critical role in informing meaningful curriculum change', which, at the very least,

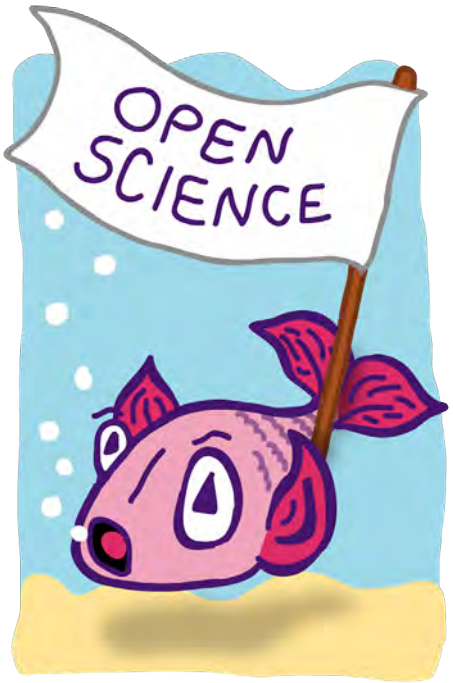
means that student leadership structures (such as the Science Students Council) should be consulted. These Senate principles apply to all faculties, and it is the responsibility of all Science Faculty departments to think about how to apply these principles in their particular disciplines. This is still a work in progress.

Decolonising science research

We, as a scientific community, have both a scientific and moral obligation to critique the ways in which science is influenced by cultural and sociopolitical factors like colonisation. Recognising the possible impact of our biases improves the rigour of the science we do. Our research should meet the highest ethical standards. We should show some humility regarding the limitations of science, recognising that science is useful for some things, but not everything. Decolonising science means respecting and incorporating IKS, which often includes holistic and long-term perspectives on ecosystems and sustainability.

We should always ask whose interests are being served by the research we do. For instance, it can be useful to ask where does the funding come from and who owns the results and outputs from the research?

'Open science' is a global movement that promotes the sharing of science data for interrogation and re-use without copyright or licensing constraint. It is based on the principle that the knowledge produced in publicly-funded institutions are a public good and should be freely available to all. Open science helps to improve efficiency and reproducibility in science. It also challenges the status quo in terms of western dominance in the academic sphere.



You might be thinking that these aspects of decolonisation are simply good practice in science. Indeed, decolonisation means improving the quality of science, as well as ensuring that our research does not contribute to the further marginalisation of people.

WHAT'S YOUR RESPONSIBILITY?

Given our country's painful history with colonisation and apartheid, it is important understand how oppressive systems from the past continue to impact both people and science today. It can be quite daunting to think about the ways in which UCT's colonial history impacts your life as a student. You may already have experienced some of the negative impacts of UCT's slow progress in transformation. Acknowledging that even science – a discipline that claims to be objective – has been impacted by these oppressive systems, is a first step towards being able to build a world that is more equitable and just, as well as science that is more accurate and inclusive.

The final question we ask in this chapter is: what is your responsibility in response to all of this? While it is important for you to be aware of these issues and to understand that UCT is trying to change, it is not your responsibility to drive this change, for now. As you navigate your UCT journey and become more comfortable within academia, you will encounter opportunities to contribute to decolonisation and transformation. Your primary responsibility at this moment is to focus on passing all of your courses, so that you can be a good, ethical and rigorous scientist tomorrow.

READ/WATCH MORE

Steve Biko: If you are interested in learning more about the writings of Steve Biko, you should read his book: *I Write What I Like*. Biko's body of work can be an incredible learning tool for all students, but is especially important for Black students wanting to conscientise themselves about the ways in which colonial systems continue to oppress and marginalise people.

Knowledge travels along trade routes, so you may be interested in **this map of 11th – 12th century trade routes**. Note that it extends south to Great Zimbabwe.

If you are interested in reading more about the history of science and maths, here are some excellent sites:

- **History of science**
- **History of mathematics**
- **Timeline of women in science**
- **History of science and technology in Africa**
- **Islamic world contributions to medieval Europe**
- **Great achievements in science and technology in ancient Africa**
- **Decolonise science – time to end another imperial era**

Read the *2022 UCT Transformation Report* **here**. See the timeline of UCT during the apartheid years **here**.

UCT policies: **Employment Equity Plan**, **mental health**, **HIV and AIDS**, **sexual harassment**, **disability**, **inclusivity around sexual orientation**, and **anti-racism**

Visit the **Office for Inclusivity and Change (OIC)**

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