

The Imprint of Education

The Imprint of Education (TIE) is a project of the Human Sciences Research Council (HSRC), South Africa, in partnership with the Mastercard Foundation that is exploring the post-graduation trajectories of Mastercard Foundation Scholars Program alumni. TIE is investigating topics such as ethical and transformative leadership, give back, employment and entrepreneurship, student support and mentoring. It consists of five sub-projects or learning activities. The TIE project principal investigators are Prof Sharlene Swartz, Dr Alude Mahali and Dr Andrea Juan.



Reimagining the African University – Conversation Series

Learning Activity Four consists of a series of conversations with experienced scholars and thought leaders on the future of higher education in Africa. In Reimagining the African University, they discuss challenges, best practices, and the potential for innovation to initiate further dialogue. This transcript is part of a series of interviews conducted in 2021 and may be used with appropriate attribution for scholarly purposes. The learning activity is coordinated by Prof Thierry Luescher, under the intellectual leadership of Prof Crain Soudien.

Interview with Prof Tshilidzi Marwala Interview conducted by Prof David Everatt on 13 May 2021

David Everatt: Could you briefly talk through your engagement with higher education in Africa, not just in South Africa?

Tshilidzi Marwala: One of the weaknesses with the South African higher education system is that, although there are many relationships with universities in west Africa and eastern Africa, it is not as connected to the rest of the African continent as it ought to be. For example, I cannot think of a single engagement between the University of Johannesburg, where I am vice-chancellor, and any of the universities in the Democratic Republic of the Congo (DRC), notwithstanding the fact that the DRC is a troubled part of the continent. This has been a great concern for the University of Johannesburg, which has 4,000 people who come from the rest of Africa.

In response to this lack of engagement, the university has initiated a project called Africa by Bus, under which its South African students visit other African countries by bus. The reason for adopting travel by bus rather than by air as the mode of transport was because O.R. Tambo International Airport was not considered an accurate representation of South Africa any more than, for example, Entebbe International Airport may be considered a representation of Uganda, or at least of those parts of Uganda where the elite do not live. So, the aim of the programme is for students to travel by bus so they can stop along the way, buying goods and seeing what is going on; and come to understand some of the complexities of language and migration on the continent. For example, they have at times had to

spend hours at some border crossings. Participating in this programme, students have visited Namibia, Botswana, Mozambique, Zimbabwe and Zambia; and there has been a plan for a trip to Rwanda

My argument about the lack of strong interconnectivity between UJ and universities on the rest of the continent derives from information on research collaboration held in the Scopus database, which lists the authors of papers published and cited in leading academic journals. This shows that researchers at the University of Johannesburg generally collaborate with peers from other universities in South Africa rather than elsewhere on the continent. Indeed, the top 20 higher education institutions with which UJ collaborates are all South African, with the University of the Witwatersrand heading the list.

In a similar vein, while visiting Kampala University in Uganda, I was told that that institution's main collaborators were actually universities outside the continent. This is a clear trend, particularly in the medical space where clinical trials may take place on the continent, as well as more broadly in the fields of science, engineering, and technology. Of course, the evidence for such collaboration is generally clearer in the STEM (science, technology, engineering and mathematics) subjects in which academic articles are often co-written by multiple authors. By contrast, there is less co-authorship in the humanities, except in the cases of mass studies in which many researchers have gathered the information – although there are relatively few of these.

Extrapolating from the data on collaboration for UJ, I would say that there is relatively little collaboration between universities in South Africa and higher education institutions elsewhere on the continent. However, it does not have to be that way given the number of African academics at South African universities who are not South African. For example, 20% of academic staff members at UJ come from outside South Africa and a large proportion of them are African. This would seem to indicate that intra-African collaboration should be quite easy.

However, this data on scholars from elsewhere on the continent masks the fact that many of them either obtained their PhDs outside Africa or in South Africa. In other words, the domestic scholarly engagement for academics from other African countries may only have taken place at the undergraduate level. Given that the level of a scholar's engagement with a PhD supervisor is probably greater than that with of a first-year undergraduate with their lecturer, these academics are not that likely to collaborate with their peers at their alma maters. However, this dynamic may change if, rather than transferring immediately to a university in South Africa upon obtaining their PhD, the African would-be academics first spends some time in their own country perhaps teaching at a local university, and thus deepens their intellectual roots there.

Everatt: There are a number of conflicting visions of what the functions of a university should be. From your perspective as the vice-chancellor of UJ, how do you see the purposes and roles of the university?

Marwala: When I was appointed, I said I was going to position this university as part of the Fourth Industrial Revolution (4IR) and people doubted this vision; they thought I was dreaming. However, there have been some significant achievements since then. For example, the university has established a new compulsory course for all students called Introduction to Artificial Intelligence. It is not a computer science course but rather a general introduction to some of the algorithms that are used in producing artificial intelligence; what they do; and some of the ethical issues around their use. In other words, it equips students to understand the issues involved. Students cannot graduate without completing the course for which a separate Certificate in Artificial Intelligence is issued.

A critical aspect of 4IR in relation to university studies is the way in which it fosters multi-disciplinarity. The solutions that are proposed as part of 4IR tend to require input from different domains. For example, efforts to create an automated speech translator require coordination between computer scientists and linguists. So, 4IR may be seen as ushering in an era of multi-disciplinarity.

However, South African universities tend not to offer multi-disciplinary studies. By contrast, when I was studying mechanical engineering in Cleveland, Ohio, I was required to undertake a number of human and social science courses, which led me to take classes in acting, psychology, economics, the history of South Africa and the history of science and technology. From my own experience and as an example of the conceptual breadth that multi-disciplinarity can foster, I learnt about the idea of reinforcement learning, which was deployed in the development of the AlphaGo computer programme for playing Go, not through a computer science course, but during an undergraduate psychology class which taught Pavlovian conditioning.

Another important compulsory course that has been introduced at UJ is the Africa Insights Module which seeks to provide a basic understanding of the rest of the continent, including in relation to its literature, politics, economy and languages.

Considering the role of the university more generally, my view is that these higher education institutions should be forging the path for the future, fostering understanding of what is taking place at present and what will take place, and preparing people for that. To this end, the university must be at the forefront of knowledge generation. This should entail deploying logic and data to address and solve problems. Accordingly, people from society, industry and government should be embedded in the university so that it remains tethered to what is happening in the real world.

Of course, this is a quite utilitarian view of the university and may be seen as failing to account for much of the knowledge being produced which lacks any immediate application. In this regard, given the role of the university in providing a view of the future, universities must be able to think beyond the present, even if such theorisation has no apparent current utility value.

Everatt: So, how do you balance the need to be relevant, that is, to promote a university which grapples with present real-world problems; with the need to promote the ability to think and produce blue-sky thinking which may not be of any great immediate relevance for many years?

Marwala: I think the best method is to establish and implement appropriate incentives. When asked to summarise the role of economics in one word, the American economist Robert Shiller replied: "Incentives." The point being, in this context, that the funding instrument that is put into place must promote the desired outcome. In other words, and more broadly, whatever your goal, you have to incentivise for it to happen.

At the same time, it is important to realise when taking charge of a large university that there is already a particular mix of scholars, some of whom will be focussed on applied work and others of whom will be theoreticians, and so on. In this respect, recruitment rather than incentives is the primary driver in achieving appropriate academic diversity and balance.

Everatt: So, what do you see as the main challenges facing the African higher education sector as a whole as it seeks to move into the future while remaining relevant?

Marwala: One of the problems in Africa is that there are not that many universities compared with, say, the United States (US) or England. Given that there are 1.3 billion people on the continent, Africa has far fewer universities that it ought to have. In other words, the African university system needs to scale up provision, which can only be achieved by deploying 4IR technologies and going online given the unaffordability of building a host of new brick-and-mortar institutions.

Then there is the issue of what universities actually do in relation to the kinds of graduates and knowledge that they are producing. In this regard, a key priority is to produce graduates who are adequately skilled to be able to take on the problems that are facing the African continent. I was shocked to read a report produced by the United Nations Educational, Scientific and Cultural Organization (UNESCO) on engineering education in Africa which identified a dual problem. First, the engineering schools on the continent were not producing enough graduates; and second, the quality of the graduates being produced was too low. So, it crucial that universities produce graduates who are fit for purpose.

In order to be able to do this, the universities must have world-class academics on their staff. One way of doing this is to recruit virtual teachers and lecturers from other countries. Finland, for example, has introduced a new category of immigration under which applicants can obtain virtual residency and be issued with a virtual work permit. So, they can work in Finland while, for example, sitting in Johannesburg. Such a scheme may produce significant benefits, introducing top teaching academics into the higher education value chain in Africa in a way that could not take place through merely offshoring such services.

And then you have the issue of knowledge production, which is a major concern given that Africa is outperformed in this sphere by some relatively small countries. In this regard, a key challenge relates to how 4IR technologies may be leveraged to produce new knowledge in answer to African needs. For example, automated machine language translators cannot necessarily hear African accents; and it was also found a few years back that the new automated face recognition systems had not been designed to recognise African faces. So, there is a clear need to adapt and produce new 4IR technologies that are fit for purpose in Africa; and African universities have a key role to play in closing the knowledge gaps.

Everatt: Online outreach is presumably a key part of the answer to massifying access to universities. It will not be people walking into an ivy-covered library.

Marwala: Absolutely. That is the future; and online outreach has been an important part of the University of Johannesburg's efforts to increase its knowledge production capacity. For example, the university has pioneered the employment of virtual research fellows, which has helped it to become the second largest producer of knowledge among South African universities, as measured by the Department of Higher Education. The university has also leveraged the relative mobility of early-career academics, ramping up the number of its postdoctoral fellows to about 450, including many from India and Nigeria. Such early-career scholars may come and stay for three years at the university, while the established academics who take up residence tend only to come on one-year sabbaticals.

The rise in numbers has been accompanied by a rise in quality, with UJ being ranked the top university on the continent in terms of impact by Times Higher Education. At the same time, there have been a number of successful efforts to enhance the university's reputation at the international level, including by recruiting senior staff from other leading higher education institutions, such as Oxford University. In part, this is due to my own activities as a speaker on the circuit when I try to ensure that UJ's profile is raised as an institution by including key colleagues. For example, when I went and spoke about AI and data regulations in African at the Berkman Klein Center for Internet & Society at Harvard Law School, I took professors from the university's law faculty. Similarly, when I was invited to speak at the Oxford Union, I went with a large number of Oxford graduates and PhDs who were now on the staff at UJ in order to project the image that "you too could come and work at my university".

Everatt: Under lockdown during the Covid-19 pandemic, the provision of laptops and data to students who lacked resources became something of a challenge. There has also been the broader challenge of institutional funding in the context of the subsidies, government support and tuition-fee grants that are available. How are you addressing this challenge? Are you having to approach the private sector for money?

Marwala: I must confess, UJ was much better placed than other universities under the pandemic lockdown because it had already been giving devices, including laptops, to its poorer students for quite a number of years. Almost 25,000 students have devices provided by the university. So, we only had to buy 5,000 devices for first-year students who qualified for them, which we had already been doing for quite a number of years.

The University of Johannesburg was also fortunate in that it made a surplus of R600 million under the pandemic, including as a result of lower electricity consumption, etc. There have also been other infrastructural investments. Two residences were built during the pandemic; the university acquired the Media24 Building from News24; and parking lots were roofed and converted into solar power generators, so that 15% of the university's electricity consumption is now solar. So, there is an engineering mindset at UJ from which other universities across the continent may learn.

Looking to the future, running an online university would be cheaper than running a brick-and-mortar institution. Meanwhile, smart deployment of 4IR thinking may lead to the integration of new technologies for producing solar energy and saving water into the university's infrastructure. This would foster the institution's sustainability, creating a more stable base for higher education, while also saving millions of Rand. In this way, universities should become factories of innovation for their own purposes, rather than only in support of other organisations.

Everatt: What is the place for indigenous knowledge systems in this vision of universities as self-sufficient innovation factories?

Marwala: For me, indigenous knowledge is already integral to the way knowledge is produced on the continent. In my book, *Closing the Gap: The Fourth Industrial Revolution in Africa*, I wrote of how my understanding of the concepts that had I learnt when I studied engineering had been informed by the knowledge passed down by my grandparents, in particular by my use of logic as this had been transmitted through my Venda culture. Similarly, in my life, I know that when I am sick or have a headache there are certain plants that offer a cure.

In this context then, there is little purpose in establishing a programme dedicated solely to the promotion of indigenous knowledge unless the idea is to leverage aspects of this knowledge to mass produce new kinds of goods. For example, by

taking natural products used by Khoi San people, which have, say, slimming properties; and extracting and synthesising the active chemical component in them so that a new product can be taken to market at scale (without having to depend on harvesting the tree or plant from which the chemical originally derived).

So, I think indigenous knowledge is important; but it should be acknowledged that it already informs the thinking of African PhD students and in, this sense, may be difficult to separate from the way that modern science is currently being produced on the continent.

Everatt: So, indigenous knowledge should not be placed in the ghetto of its own university department. In this regard, I like the idea of the compulsory courses that have been established at UJ which ensure students learn about Africa and African values and languages, as well as about AI. In this way, students can come to understand both indigeneity, that is, who you are and where you are from; as well as why and how technology fits into that. What would you say is the single biggest challenge faced by the university today?

Marwala: I think the biggest challenge for the university is whether and how it is going to remain relevant. The fact that a student can go and learn what they want to learn from some of the top universities around the world is challenging the very foundation of what a university is supposed to do.

Everatt: This is challenging African universities?

Marwala: Well, it presents an opportunity for African universities. For example, it will lead to a rethink at UJ as to whether the university should continue as it is, in the manner in which it was built; or whether there is a need for change, and what the implications of that may be.