



Professor Tshilidzi Marwala, outgoing vice-chancellor of the University of Johannesburg (UJ) in South Africa, Image: UJ

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African HE can be more competitive through 4IR technologies

Mark Paterson and Thierry M Luescher 26 October 2022

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Universities across Africa need to embrace the new technologies being forged under the Fourth Industrial Revolution, or 4IR, to expand their educational capacity and produce relevant new knowledge, according to Tshilidzi Marwala, outgoing vice-chancellor of the University of Johannesburg (UJ) in South Africa.

Meanwhile, South African universities, which are too disconnected from higher education institutions in the rest of Africa, must adopt a greater pan-continental focus as part of their own contribution to development efforts, he said.

"One of the problems in Africa is that there are not that many universities compared with, say, the United States or England. Given that there are 1.3 billion people on the continent, Africa has far fewer universities than it ought to have," he said.

"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."

In particular, the online world may be leveraged to enable access to an international pool of academics who could boost the teaching and knowledge-production capacity at universities in Africa, according to Marwala.

To this end, he advocates the adoption of a Finnish model for immigration under which applicants can obtain virtual residency rights, so that "top teaching academics [may be brought] into the higher education value chain in Africa".

He further cited the University of Johannesburg's efforts to increase its knowledge-production capacity by pioneering the employment of virtual research fellows – a move which has helped it to become the second-largest producer of knowledge among South African universities, he said.

Solar energy technology may bolster infrastructure

In addition, Marwala emphasised how smart deployment of 4IR thinking can strengthen institutional resilience and independence at African universities. In particular, he described how the integration of new technologies for producing solar energy and saving water may bolster the infrastructure.

"This would foster the institution's sustainability, creating a more stable base for higher education, while also saving millions of rands," he said. "In this way, universities should become factories of innovation for their own purposes, rather than only in support of other organisations."

The use of 4IR technologies also plays a crucial role in helping African universities improve their performance as knowledge producers in support of national development, he said.

"The issue of knowledge production ... 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," said Marwala, who has been appointed as rector of the United Nations University in Tokyo, Japan, starting in March 2023.

"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."

In this regard, he described how, under his leadership, UJ 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," he said.

"In other words, it equips students to understand the issues involved."

4IR and multidisciplinary

Marwala also described how a 4IR approach fosters multidisciplinary, although South African universities generally fail to offer studies that breach conventional disciplinary boundaries.

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"The solutions that are proposed as part of 4IR tend to require input from different domains," he said. "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 multidisciplinary."

Marwala's other key focus as vice-chancellor at UJ has been a drive to promote a greater pan-African engagement at the institution. "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," he said.

"For example, I cannot think of a single engagement between UJ ... and any of the universities in the Democratic Republic of the Congo. This has been a great concern for UJ, which has 4,000 people who come from the rest of Africa."

In response, he described how the university has initiated a project called "Africa by Bus", under which its South African students visit other African countries by bus – "stopping along the way, buying goods, and seeing what is going on; and [in this way] come to understand some of the complexities of language and migration on the continent".

UJ has also introduced a compulsory African Insights Module for students, which seeks to provide a basic understanding of the rest of the continent, including in relation to literature, politics, economy and languages.

Lack of partnerships

Meanwhile, Marwala bemoaned the lack of knowledge-production partnerships between South African academics and their contemporaries across the continent.

"Researchers at UJ generally collaborate with peers from other universities in South Africa rather than elsewhere on the continent," he said. "Indeed, the top 20 higher education institutions with which UJ collaborates are all South African."

"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, Marwala noted, this data on scholars from elsewhere on the continent masks the fact that many of them either obtained their doctoral qualifications outside Africa or in South Africa and are, thus, not so likely to collaborate with their peers at their undergraduate *alma maters*. One solution to this, he said, would be to incentivise greater engagement by African academics in their own countries' higher education systems once they have obtained their doctorates.

"If the African would-be academics first spend some time in their own countr[ies], perhaps teaching at a local university, [this would deepen] their intellectual roots there."

This article is based on an interview conducted by Professor David Everatt for 'The Imprint of Education' project, which is being implemented by the Human Sciences Research Council, South Africa, in partnership with the Mastercard Foundation. This project, which includes a series of critical engagements with experienced scholars and thought leaders on their reimaginings of higher education in Africa, investigates current and future challenges facing the sector, including best practices and innovations. Mark Paterson and Thierry M Luescher edited the transcript for focus and length. Features already published in the series can be downloaded from the HSRC's website.

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