PROF MANDLA MAKHANYA

PRINCIPAL AND VICE CHANCELLOR: UNIVERSITY OF SOUTH AFRICA

UNESCO MOBILE LEARNING WEEK 2019

05 MARCH 2019

PARIS, FRANCE

Let me begin by making a broad sociological statement. The human history is a long tale of revolutionary role for technology, from Stone Age to the Digital Age. From the Steam Engine to Satellite Technology.

A radical technological turn is once again upon us. My disposition is always to embrace technology rather than resist it. Technologies are tools for human survival. Consequently, across time and space, human beings have consistently invented technology with the intention to enhance life chances and to get the most from the environment and even

human labour. What is upon us this time is artificial intelligence as a leitmotif of the Fourth Industrial Revolution. It presents great opportunities.

On the other hand, we are reminded that the innovation of air travel culminated (for now) in supersonic travel that gave us the Concorde. Yet, the development of the fast jet engine, which can reach supersonic speed, has also given us fighter jets.

My reflections in this presentation will be specific to the opportunities made available to higher education by AI. I will do so, just like I have highlighted on the beauty of the jet engine.

On UNISA

The best place to start off is to provide a brief introduction on the University of South Africa. Ours is a 145-year-old institution which, from the very first day, was what was then called a correspondence university.

We are a comprehensive public research institution that is one of the mega universities, having enrolled 374 531 formal students in 2018: 309 572 undergraduates, and 50 442 postgraduates. Of the postgraduate students 4 668 were enrolled for the Master's degree, while 2 071

enrolled for Doctoral. The rest were enrolled for Honours and Post Graduate Diplomas (43 703) and for non-degree purposes (14 517).

With the ongoing postgraduate registration process, our preliminary registration figures are standing at 269 843 students in 2019.

My entry point is my experience on how technology has enabled us to become the biggest university on the African continent, which also leads in Open, Distance and electronic Learning (ODeL) across national borders. Ours has been a tale of conquering space and time in the domain of higher education. All these were made possible due to effective utilisation of technologies, especially information and communication technologies.

What is Artificial Intelligence and what are some of the questions to be considered?

In approaching this presentation, I will employ the definition of Artificial Intelligence as provided by Popenici and Kerr, who view it as "computing systems that are able to engage in human-like processes such as

learning, adapting, synthesizing, self-correction and use of data for complex processing tasks".[1]

The key questions for us are therefore:

- How can we extract value from the use of Artificial Intelligence?
- What are the opportunities that can cascade from developments in that area? And, what are the challenges?

The reality of Artificial Intelligence

There can be no debate that the pedagogical landscape is changing at a fast rate. As Subhash Kak correctly observes, many universities are adopting online education, so that they may satisfy the demands for those students who are not able to attend contact lessons on campus.[2] This is true for the Northern counties as it is for us in South Africa.

In our case, the key drivers of this are, first, cost (the fact that enrolment costs for distance and online learning are lower – however, this is true only in the context of economies of scale) and, second, lack of adequate

[1] Popenici, Stefan. A.D. and Kerr, Sharon (2017) Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning* (2017) Volume 12 Article 22
[2] Kak, Subhash (2018) Universities must prepare for a technology-enabled future. *The Conversation*. Accessed on 01 March 2019, from https://theconversation.com/universities-must-prepare-for-a-technology-enabled-future-89354

spaces in contact universities. The latter point has seen many young people who should ordinarily be absorbed by contact universities enrolling with UNISA.

In his article Kak reminds us how the Medieval University, upon which our current system is based, used to collect massive volumes of books and manuscripts. This attracted scholars to these centres for study.

UNISA and Artificial Intelligence so far

The UNISA library used to order thousands of hardcopy journals per year for use by researchers. Digitisation has meant that we make more journals than we could have ever imagined available online. This, as Nick Bostrom notes: "once something becomes useful enough and common enough it's not labelled AI anymore".[3] We indeed take the availing of journals and eBooks as a 'normal thing', whereas it is part of a technological innovation that has revolutionised our library offerings.

Another area where we use artificial intelligence extensively is in our postgraduate supervision and assessment. Plagiarism-identification software has all but eliminated the challenge that lecturers have, not being able to know if a student has copied an essay or dissertation that

---

[3] Quoted in Popenici and Kerr (ibid)

already exists. If there is one area that the higher education sector has benefitted immensely from it is this one.

Let me now turn to some of the areas that we think may be of benefit.

Some opportunities for AI at UNISA

As an institution we do not hide the real concern around the low student throughput rate. We are studying how an education district in Tacoma, Washington, is employing a "… comprehensive data snapshots (which) allow(s) teachers and principals to predict dropout probability and enable them to provide additional learning assistance early enough to turn at-risk students around."[4] It is said that graduation rates in that district improved from 55 to 78 percent as a result of this innovation. That is certainly something that we will consider for UNISA.

We are also studying some of the innovations that our Chinese and USA counterparts are already implementing or still piloting.

There is an online platform for discussion, where students pose questions, and have those questions aggregated by the computer for

[4] Anon (undated) Artificial Intelligence for Africa: An Opportunity for Growth, Development, and Democratisation. University of Pretoria. Accessed on 01 March 2019 from https://www.up.ac.za/media/shared/7/ZP_Files/ai-for-africa.zp165664.pdf

provision of feedback.[5] The system yielded a 97% accuracy at the Georgia Institute of Technology, a public research university in the USA.

Another system that we are looking at is being developed in China "to understand the general logic and meaning of text in academic essays and make a reasonable, human-like judgment about their overall quality. It then grades the work, adding recommended improvements in areas such as writing style, structure and theme."[6]

It is our understanding that such a system will not replace the lecturer. Like the plagiarism-identifying software, it will enhance the work of lecturers in that it provides preliminary assessment on a student's argument and point them to areas that require focused attention.

A related innovation is the e-rater engine, which "provides a holistic score for an essay as well as real-time diagnostic feedback about grammar, usage, mechanics, style and organization, and development."[7]

It can be said that this is an advanced version of what an ordinary computer does in the form of spelling and grammar check. Universities

[5] Ibid, pg. 15
[6] Ibid, pg. 15
[7] Ibid, pg. 15

will surely benefit from this advancement, especially for a large university such as ours. In that way, the lecturer will be freed up not to take more time on the student's presentation (in terms of styles etc), but to focus on content of that presentation and develop the student's analytical skills.

The last major area of innovation that we are looking into is that of intelligent tutoring systems. Arising from demands from our students we expanded our tutoring systems to include e-tutoring. This involves tutors assisting students online. The next step is to employ intelligent tutoring systems that can enhance the student experience.

It is perhaps on the administrative side, supporting the academic project, that UNISA will benefit from advances in AI. The university has phased out the paper-based application and registration system. Yet, the back end of that process is still attended to by our staff. This is proving to be a serious challenge, especially as our student numbers have grown exponentially. We are therefore exploring how we may employ systems that will not only receive but assess and process the application and provide feedback to the applicants. The system would later process the registration and subsequent stages to enable the student to be fully integrated into the system.

To achieve this, we will have to employ machines that are not only programmable, but those that can "learn patterns and make predictions" Popenici and Kerr (2017). This will then free-up our staff to attend to complaints and appeals, and thus offer students better service.

Having outlined some of the opportunities that are presented by AI it will be naïve of us to claim that there won't be major challenges as we march forward to embracing the countless possibilities of human ingenuity.

A word of caution

We need to keep our eyes open though to the fact that I am not advocating a replacement of faculty with AI. For me AI may assist the teaching staff to do their work efficiently and effectively, but we need to accept that the centrality of the lecturer in academic engagement is still crucial. Higher education is a people-centred activity. It must not be reduced to a form of hegemony by tech-enthusiasts.

Blind AI enthusiasm may inadvertently lead to a dehumanisation of the higher education experience. Universities must remain spaces where students and lecturers learn the important skills of human interaction, and concern for fellow human beings and the environment.

Education should be a rehumanising effort aimed at making us a better species that is not just preoccupied with basic elements of survival. We are a species that is interactive and care for each other, a species that understands that 'I am because of because of you; and you are because of me'. This is what we call the *Ubuntu* philosophy of life.

Conclusion

It is on the tail of this that I wish to submit my closing remarks. Based on my experience at UNISA and having seen many changes and adaptations over the many years - from sole reliance on paper-based correspondence and ways of 'doing business', to embracing technological platforms and successful employment thereof – I see massive opportunities cascading from artificial intelligence for higher education in general.

I submit that my continent, Africa, and the higher education system in particular, must not only prepare for the current technological turn, but that we must catapult ourselves into a space where AI is the name of the game. We must effectively use it to stimulate growth and development, as well as democratise our landscape.

Thank you.

References

1. Anon (undated) Artificial Intelligence for Africa: An Opportunity for Growth, Development, and Democratisation. University of Pretoria. Accessed on 01 March 2019 from https://www.up.ac.za/media/shared/7/ZP_Files/ai-for-africa.zp165664.pdf

2. Popenici, Stefan. A.D. and Kerr, Sharon (2017) Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning* (2017) Volume 12 Article 22

3. Kak, Subhash (2018) Universities must prepare for a technology-enabled future. *The Conversation*. Accessed on 01 March 2019, from https://theconversation.com/universities-must-prepare-for-a-technology-enabled-future-89354