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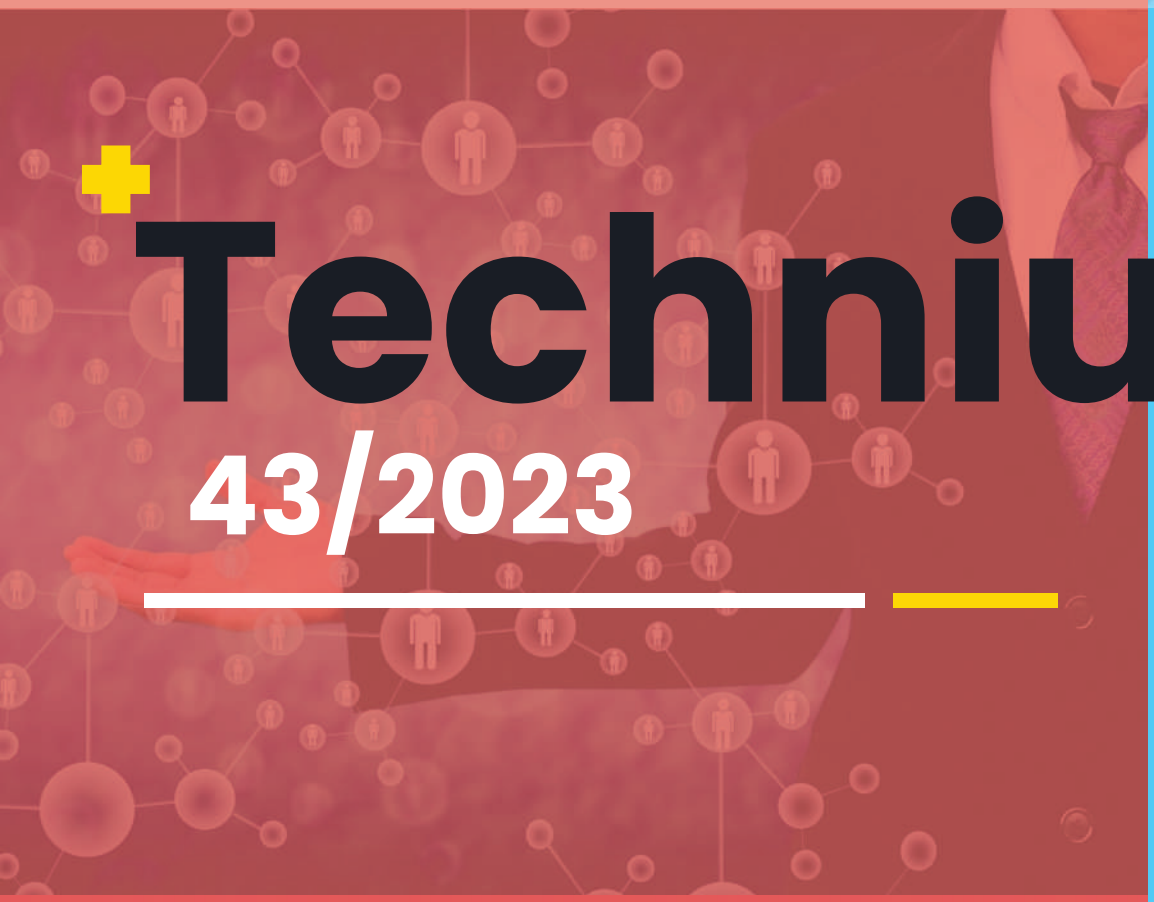

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African higher education institutions catching up: The potential of 4IR in closing the digital deficits

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Abstract. The new digital cultures brought by the Fourth Industrial Revolution (4IR) are forcing universities to transform their practices as they prepare students for a future that will magnify the use of digital tools. Throughout the world, institutions of higher learning are gearing to maximise the benefits that could be gained from the 4IR. The concept, *engaged university*, ensures that the universities will not leave the communities around them behind as they prepare for the future, for universities will play a huge role in contributing to the progress in societies. This conceptual article examines the opportunities of 4IR in African institutions of higher learning. The 4IR has potential to solve many of the ills in Africa, for the African societies still suffer ill health, poverty and illiteracy. The promise of the 4IR brings hope of minimising these ills as Africa moves towards advancement. Furthermore, there has been much balkanisation in African education hence some believe that the 4IR can create links between institutions within states and the entire African continent. Not only will new technologies transform research, scholarship and teaching, but these would also have impact on bringing forth new epistemologies although there is still a battle for more resources. The major challenge for 4IR in Africa will be to create links between new technological cultures and African cultures; universities are well-placed to face such challenges.

Keywords. Digital cultures, disruption, knowledge production, transformation

1. Introduction

Arguably, one of the greatest achievements in the 21st century has been the arrival of the Fourth Industrial Revolution (4IR) which is fast changing how things have been done in education institutions and in societies around the world. New digital cultures and digital tools are transforming the agendas and programmes in our higher education institutions in particular. The 4IR sweeping the world is depicts numerous ways in which the higher education institutions can change the world we live in. Universities are always at the centre of societal development through teaching, research and community engagement but in Africa many universities encounter several challenges as they try to implement technology across the curriculum [1]. But the nature of education continues to transform rapidly as a result the fast-changing role of universities in society [2]. The university in Africa needs to realise that more skills are necessary to adapt to the future demands of not only Africa but the world. The PwC [2] spells this out succinctly when they contend that universities have to equip students so that they leave their campuses ready to add value to worldwide knowledge; “the skills needed for the future are not

just about science and technology. Human skills like creativity, leadership and empathy will be in demand". The future depends on students and their teachers who must understand the new demands that seek innovation and advanced knowledge production. In Africa education institutions should be able to use industrial revolutions to address ills such as poverty, disease and literacy. Paterson and Luescher [3] cite Marwala who argues that through the 4IR universities would be able to expand their educational capacity and ensure that African institutions adopt a pan-continental focus rather than being disconnected as they are currently. Therefore, one of the huge potentials of the 4IR is the ease of collaborations across the continent.

Zeleza [4] underscores the need to rethink the internationalisation of African institutions after COVID- 19's effects. Zeleza adds that COVID-19 became a catalyst for much needed institutional change. Furthermore, the changes had implications in six areas for universities in Africa and these are; rethinking the nature of academic programmes; delivery of teaching and learning; human resources; resource mobilisation and utilisation; institutional partnerships and the nature of leadership skills [4]. The growth of intellectualism and the advancement of technologies and ideologies have influenced the transformation in higher education. The institutions of higher learning are finding that transformation is unavoidable and that the role-players have much to unlearn to acclimatise in internalising the disruptive technological changes. In several instances the debates on 4IR in Africa have crossed paths with the debates on decolonisation and Africanisation of higher education institutions. With the introduction of 4IR in Africa the question is whether this will finally rid Africa of the last vestiges of colonial education and related epistemic violence. Africa still has a myriad challenges; hunger, poverty, low life expectancy and communities believe that universities should have the answers to many challenges that beset the African Continent. Some intellectuals maintain that the Fourth Industrial Revolution will be a boon to the institutions in Africa. Maringe, Ndofirepi and Osman [5] maintain:

The 4IR and its accompanying increased innovations in technological use will heighten and have impact on the development and use of renewable energy, the efficacy of fuel and the storage of energy, which, in turn, will make investments in these fields become progressively cost-effective, whilst enhancing gross domestic product growth, and concomitantly lessening climate change, which is one of today's most critical universal challenges…

It also seems that many believe that the 4IR will not transform universities only but will change all institutions to be more global with impacts on areas such as leadership and governance, business, knowledge production and improvement of human lives. The advent of the 4IR heralds a new era whose innovation and technology are likely to change the present. Additionally, the 4IR will influence not only research but teaching and learning as it nurtures a new student. Ndung'u and Signe [6] state that the transformative potential of 4IR in Africa is substantial as they list a number of factors; it will encourage economic growth and structural transformation, fighting poverty and inequality, reinventing labour skills and production, increasing financial services, fixing the labour-skills mismatch as well as modernising agriculture and agro-industries. Many institutions of higher learning in Africa have realised the critical purpose of technologies hence students are allowed to use various digital tools to adapt to new digital cultures. Yet African governments experience various challenges when it comes to the new digital cultures accompanying the 4IR. Ischebeck [7] points out that although technology would bring major benefits for African students, obstacles may thwart opportunities.

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Ischebeck [7] lists five major hurdles to overcome in Africa and these are; internet access, availability of locally created courses, training and development as well as language barriers. This article examines the role of 4IR in transforming universities as it explores whether the opportunities overcome obstacles as it is embraced in institutions of higher learning. The following are the subtopics the discussion follows:

- The nature of the 4th IR
- The Fourth Industrial Revolution as Recolonisation?
- The Fourth Industrial Revolution, access and Success
- Knowledge production in a 4IR era
- Teaching and learning in 4IR Environment
- Implications on the future

2. The nature of the 4th Industrial Revolution

Coined by Klaus Schwab, founder and executive chairperson of the World Economic Forum, the term 'Fourth Industrial Revolution' is described as "the advent of cyber-physical systems involving entirely new capabilities for people and machines. Sometimes referred to as 4IR or Industry 4.0 this represents a social, political and economic shift from the digital age of the 1990s and early 2000s [8]. Hermann [9] highlights four themes that summarise 4IR and these are ***interconnection*** (machines communicating with one another), ***information transparency*** (due to huge data operators can make decisions), ***technical assistance*** (technology helps humans in decision making and problem solving), and ***decentralised decisions*** (ability of cyber physical systems to make decisions). These show the fundamental change in the way life will be changed by the 4IR. Ndung'u and Signe [6] summarise the 4IR by stating that it is a fusion of the digital, biological, and physical worlds, as well as growing utilisation of new technologies such as artificial intelligence, cloud computing , robotics, 3D printing , the Internet of Things, and advanced wireless technologies. These authors argue that in the past revolutions, Africa was left behind and wonder whether it would be able to catch up this time around. It will be through 4IR that Africa can also be a global powerhouse.

Schwab [10] explains at length how the 4IR will change the world. Schwab points out that this will disrupt the society we live in as impacts on every sphere of our society including government, people, business, the future. Schwab contends that the future whilst 4IR will reshape economic, social, cultural and human environments, it brings with it promise of the future. In fact, Schwab [10] summarises this by stating:

> In the end, it all comes down to people and values. We need to shape a future that works for all of us by putting people first and empowering them. In its most pessimistic, dehumanized form, the Fourth Industrial Revolution may indeed have the potential to "robotize" humanity and thus to deprive us of our heart and soul. But as a complement to the best parts of human nature—creativity, empathy, stewardship—it can also lift humanity into a new collective and moral consciousness based on a shared sense of destiny. It is incumbent on us all to make sure the latter prevails.

This sense of destiny and moral consciousness should also ensure that institutions such as universities strengthen their relevance in society. Zeleza [4] argues that universities especially those in Africa need to reinforce their research and teaching as they respond to the demands of the 4IR. Many experts also concur on the critical role that universities can play in

an era of 4IR ([3], [11], [12], [13]. In the years 2020 and 2021 the COVID pandemic threatened to bring everything to a halt and this includes education institutions in Africa and the world. Whilst there had always been fears that the 4IR and new digital cultures will deskill people the COVID shutdown forced education institutions to adapt to new digital cultures. Seepe [14] explains the nearness between COVID 19 and 4IR:

COVID-19 and 4IR have altered how people live and work. Of interest is how both COVID-19 and 4IR impact on educational practice. COVID-19 has forced us to move quickly into the digital space. Universities and schools have had to quickly revamp their online and digital platforms in an effort to save the academic project and human lives. In doing so, they found themselves redefining what learning and teaching entails. Multimodal teaching and learning have become the 'new normal'. This calls for a redefinition of what constitutes a 'classroom', 'student', and/or a 'teacher'

The COVID 19 pandemic brought the necessary disruption in ways that institutions and people have been doing things in the past. Many institutions are now used to hybrid teaching and learning where there is both online and on-site teaching and learning. Others have highlighted the enhancement of blended learning which has helped expand access to education. Mhlanga [13] suggests that for blended learning to be successful it is critical to have a policy platform that addresses inequality, skills deficit and the huge digital divide.

3. Will the 4IR bring the recolonisation of Africa?

In an age of decolonisation we may ask can technological tools help in decolonising institutions of higher learning or will the 4IR help in recolonising the universities in Africa. There are many who believe that the 4IR would redeem not only the university but the society in general. Whilst many may perceive the coming of 4IR in positive light, there are also several who see the negative role of the 4th IR on Africans. In what he calls the coloniality of data, Benyera [15] argues that the looting of African resources that started with human capital and natural resources now pervades via digital resources looting. Using the decolonial lens, Benyera perceives the 4th IR as a process that would further marginalise Africa as it ceases power without the improvement of social justice or epistemic freedom. Kaure [16] concurs with Benyera by pointing out that Africa cannot talk about 4IR when many African states are in the 2IR. Furthermore, Kaure states that Africans do not have the right tools to really march towards the 4IR especially when one acknowledges that millions in Anglophone, Francophone and Lusophone Africa cannot converse in official languages of their respective states. Africa still depends upon the West since the times of colonisation. "Developing on the notion of the "Coloniality of Data", the fourth industrial revolution is postulated as the final phase which will conclude Africa's peregrination towards recolonisation" [16]).

However, Onwughalu, and Ojakorotu [17] argue differently from Benyera and Kaure above for they maintain that if the African states resist the 4th Industrial Revolution the continent may easily be recolonised. These authors refer to this as self-inflicted recolonisation for the 4th Industrial Revolution has possibilities of ensuring benefits in efficiency and productivity. These authors conclude by stating that the 4th Industrial Revolution will enable the African states to develop under a conducive environment. Therefore, whilst others may find the 4th Industrial Revolution as weapon of recolonisation others see it as a process of development and success. Zeleza [12] points out that the African continent was marginalised in the previous three industrial revolutions and the continent must not be left behind in the fourth. Zeleza adds that

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Africa must promote digitalisation "rethink capital expenditure and develop holistic online curriculum system to achieve its economic, digital transformation". Some experts have argued that in a post COVID era, technology is very vital for economic growth. There is also this great hope when some people think about the Fourth Industrial Revolution in African institutions. Signe [18] explains:

By 2050, Africa will have more than half of its population under the age of twenty-five, housing the world's largest youth-oriented potential workforce. But, in the post-COVID-19 era, the African continent faces the challenge of regaining the successful trajectory of economic growth and employment opportunity before the pandemic hit. Here, 4IR technology represents a massive opportunity for growth in supporting African countries' positive development.

Therefore, while some may believe in recolonisation as a result of fourth Industrial Revolution, some maintain that the 4th Industrial Revolution brings Africa closer to global world. Signe [18] links the fourth Industrial Revolution to massive opportunities for growth jobs, reduction of poverty and the growth of the manufacturing sector. If the 4IR can do these people may hope that it can do more for institutions of higher learning. The universities can help fight economic challenges liked to structural transformation. In fact there is wide belief that the Fourth Industrial Revolution and digitisation will transform Africa into a global powerhouse [6]. The optimists maintain that there are so many ways that the 4IR technology can be transformational in African societies. In fact, Ndung'u and Signe [6] contend that among others 4IR will increase financial services and investment, reinvent labour, skills and production, fight inequality as well as modernise agriculture. The Fourth Industrial Revolution has to ensure that that the role of the university in society is relooked as universities strive for relevance. The universities today ought to enhance skills and adapt to survive the demands of society. Students have to leave the institutions of higher learning ready to add value to businesses and universities must also prepare them for skills other than science and technology [2]. Creativity, leadership and empathy are some of the myriad of skills students need from their institutions.

Education planners, communities, managers and several role players in higher education should discuss the envisaged goals in using the Fourth Industrial Revolution.

4. Fourth Industrial Revolution and Access and Success of Students

All universities are concerned with access and success of their students especially in facing the demands of the automaton economy. The focus on the Fourth Industrial Revolution has been interested in examining the opportunities brought by the 4th Industrial Revolution. In Africa the role-players may be interested in examining whether or not the institutions of higher learning would respond to technology era and what would be the benefits to students. It would also be crucial to examine how the teaching as well as research would respond to the technology mandates. Any good innovation at universities should support education in the present and the future. Sekiyama [11] points out that the World Economic Forum which a is a chief promoter for the fourth Industrial Revolution states that education models should reflect the demand for lifelong learning as this would help the populace to cope with technological and social changes. At universities these would be critical in supporting student mobility and improvement of graduation rates. The growth of the internet and digital tools should enable universities to enhance student learning. Furthermore, the 4th Industrial Revolution enables the universities to

Technium Social Sciences Journal
Vol. 43, 85-96, May, 2023
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help solve societal challenges. As they do this the technologies will convert information into knowledge hence students need cross-skills [11]. Sekiyama [11] opines:

Universities must equip graduates with "cross-skills" which are non-cognitive skills in communication, translation between technology and practice, empathy, and critical thinking. Most university curriculums are designed around consumption of knowledge. However, in a time when computers can extract information from thousands of textbooks in a second, humans consuming the content of tens of textbooks is relatively insignificant. Similarly, in an age where intelligent machines can perform countless tasks in a moment, it is not necessary for many people to become proficient in similar tasks. Rather, the challenges of the Fourth Industrial Revolution require cross-skills.

The 4th Industrial Revolution brings innovations that prepare student for different futures. There is also hope that this revolution will enable universities to deal with diversity and distance. In Africa there are many students who are far from institutions of higher learning and who might never have adequate links with their institutions. However, the 4th Industrial Revolution makes universities accessible. Today information technology develops into online communication that displaces traditional in-person communication. The COVID-19 pandemic shutdown has in 2019 and 2020 disrupted education and imposed the adoption of the 4IR technologies as the modus operandi. Institutions of higher learning were forced to use digital technologies and of course some were more prepared than others. The introduction of 4IR strategies was inevitable for all institutions hence technophobes also found themselves having to adapt to digital teaching and learning.

Digital learning as a new literacy of the 4IR, has only received attention during the COVID-19 pandemic by many institutions of higher learning in South Africa. Digital learning has been pivotal in taking care of the needs of all students. Digital learning is defined as the delivery of digital forms of media (e.g., texts or images) via the Internet; and the provided learning contents and teaching methods were intended to enhance learning and improve teaching effectiveness or promote personal knowledge and skills [19]. Computers and network technology media were used in learning situations. Kaklamanou *et al*. [20] argue that these networks include synchronous and asynchronous network learning, to overcome time, location, and schedule constraints and achieve learner-centred individualised learning. Keane [21] identifies four elements of digital learning:

Digital teaching materials -emphasise that learners can learn by extracting some of the contents of digital teaching materials such as e-books, digitalised data, and other digitally presented contents.

Digital tools – examine the importance of learners continuing their learning activities using digital tools such as desktop computers, notebook computers, tablet computers, and smart phones.

Digital delivery – ensure that learners' learning activity can be delivered via the Internet, such as the intranet, internet, and satellite broadcasting.

Autonomous learning - focuses on learners' engagement on online or offline learning activity on their own via digital learning. It emphasises personal autonomous learning and requires learners to participate in autonomous learning.

5. Knowledge production in a 4IR era

Technium Social Sciences Journal
Vol. 43, 85-96, May, 2023
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Knowledge production is what makes universities productive and in an age of new digital tools, the 4th IR is pivotal. African institutions while they dapple with transformation of institutions they also have to examine how knowledge production can enhance Africanisation and decolonisation. Therefore, as higher education role-players focus on 4IR, they need to explore how this can enhance the growth of the engaged African institutions of higher learning. Sanchez-Cruz [22] links the effective knowledge production to the 4th Industrial Revolution. He states that there is a relationship between the 4th IR's policies assist in knowledge production and the country's development. The African university will embrace transformation by acknowledging the huge steps they need to take in recognising the potency of 4IR even in empowering them to enhance their agenda of decolonising their institutions. Sanchez-Cruz [22] points out that great changes "have been developed in the virtual environment such as the Big Data, smart cities, the Internet of Things and Artificial Intelligence, which are essential tools for managing the new era, known as the 4IR. This means that our universities ought to be ready and prepare new ways in which they will collaborate with other role-players including communities and other local and international institutions. What our universities teach and how they engage with intellectual work will be as developed as the way they accommodate the multidisciplinary nature of the 4th Industrial Revolution. This Revolution will change the way we have seen universities in the past under traditional practices. The 4IR will enable universities in Africa to shift from the ways in which university education has been in recognising only Western knowledges but will now recognise the importance of ecologies of knowledge which accommodates knowledges that have been marginalised. The 4th Industrial Revolution style of knowledge production will see the interconnectedness of knowledges hence the recognition of bringing all knowledges to the centre. Technology will bring social justice and epistemic freedom in higher education institutions. Information from various parts of the world will be easy to critically engage in a virtual environment. The 4IR university environment will use technology to enhance scholarship and improve research and knowledge. Sanchez-Cruz [22] affirms:

The 4IR establishes a context in which new ideas, possibilities, creations and innovations are part of everyday life; and the main rule is about breaking limits (Kayembe & Nel, 2019) in exchange of comfort for the human life. The 4IR has an impact not only on technology, but also on the way we live, work and interact. Technology serves as a tool to give the greatest number of people the ability to positively impact their communities (World Economic Forum, 2022). However, at the same time, new unknown problems arise, which according to Jung (2020), should be handled with the support of the same technological advances and social networks.

All institutions aim at developing knowledge and producing the best students to be ready for a future of a competitive world. The framework of the 4IR will while raising the university's standing globally, will engender multidisciplinarity, transdisciplinarity and intradisciplinarity. For years students and their lecturers have been looking narrowly at uni-disciplinarity. Multidisciplinarity should begin with research that will be in line with 4IR.

The role s of 4IR at African universities have huge implications. Universities have to see how to overcome the challenges in the education systems. Without certain skills, knowledge production will not be possible hence institutions of higher learning should take into cognisance the following skills; digital literacy, digital competency, digital fluency, as well as digital

resources for curriculum transformation. Below, we briefly delve into these because they are crucial in understanding the basis of knowledge production in higher education institutions.

Digital Literacy

My understanding of a digital literate person is that such a person should be capable to use digital tools and resources effectively for teaching and learning. As Ferrari [23] argues, digital literacy is the knowledge of a set of competencies and skills required to comprehend and use computers and software programmes productively and successfully for both personal and professional purposes. These programmes are used primarily to interact, collaborate, and do information searches with people all over the world. Gurak [24] expounds that digital literacy frameworks, emphasised the necessary skills that allow one to find, organise, understand, rate, and analyse information using digital technology. All these activities occur in HEIs and cannot just happen without specific level of cognitive ability. Recent research shows that institutions of higher learning should prepare their personnel and students with skills required by a transformative work environment brought by 4IR. These authors add that we are no longer on the brink of a technological revolution but we are in its midst hence skills are critical for all stakeholders. The institutions of higher learning should produce the best of students who have all the necessary skills needed by future employers. The students should be empowered and they should believe that they can effect changes in their communities after graduating.

6. The 4IR and its Educational Implications

As seen above, several debates the 4IR will improve education and I also think that Africa and the third world in general if the obstacles are minimised higher education institutions may improve the students' performance. Yende [26] argues that the 4IR has been among the main driving forces in improving higher education in the world. Furthermore, Yende states that technologies associated with the 4IR have created efficient teaching and learning in the 21st century. as we speak of building an engaged university in Africa we also need to focus on how Africans can use technology to improve communities. "Universities are at the centre of societal development through teaching, research, and community engagement programmes. Thus propelling the 4IR agenda in its academic enterprise operations, universities affect their communities" [1]. Although many countries especially in the developing world would like to keep up with the advances in 4IR it has not always been like that for most education systems are still in the Education 2.0 era rather than Education 4.0 (Ally & Wark, 2020). But Ally and Wark concur with many other researchers who argue that as developing countries move into the 4IR, they have huge chance of using smart technologies to improve quality and efficiency. When it comes to education, developing countries can use 4IR to deliver to learners irrespective of their status and location especially remote locations [27]. The other major achievement of 4IR in education is the promotion of learner-centredness and individualisation [27], [28].

Frequently, people highlight the impact of 4IR on learners without sharing information on the implications for teachers. All teachers in basic education and in higher education are forced to change their teaching strategies hence they need to embrace the empowering aspects of 4IR. Maringe and Chiramba [29] state that it is important for education in the 21st century to have teaching that promotes higher education graduates' relevance in the 4IR era. Maringe and Chiramba [29] also point out that skills taught at higher education institutions should reflect the complex, competitive, knowledge based, information age technology-driven society. Teachers need constant support if they are to develop the students well during the 4IR. Intel [19] spell it out that teaching in the 4IR implies that teaching strategies need to transform. Effective teachers

will be those that transform students so that they move beyond rote learning as students learn how to apply, analyse and create using what they learn in the classroom.

Teachers during the 4IR should be facilitators who allow technology to support the students' flexibility in gaining skills. Furthermore, teachers should avoid the teacher centred lecturing approaches as they facilitate learning that meets students where they are in thinking and engagement process [19]. the 4IR has brought with it teaching strategies that accommodate new standards in classrooms that operate in remote, hybrid ad in-class environments. Intel [19] states that these teaching strategies include;

Flipped classroom – here students complete class work at home but also take part in classroom activities.

Active learning – this is a teaching method that encourages students to learn by doing.

Collaborative classrooms – this student-centred shared environments appeal to technology loving students who play an active role in learning.

7. Curriculum, Teaching and Learning in 4IR Environment

The COVID-19 literature is hypothesised on the believe that the curriculum could be transformed through the 4IR technologies. Shay [30] refers to curriculum transformation as curriculum reform or updating or renewal which includes changes in the content of education. Essentially, curriculum transformation aims to create teaching and learning environments that would bring about desired changes in learners, that they become "more knowledgeable, better skilled or to influence their attitudes and values positively" [31]. Ossiannilsson et al. [32] opine that while transformation brings desired changes in learners, however, there are advantages for equity, confidence, and transparency to attain alternative resources and socially constructed meaning. It is from this notion that the pedagogical practice offered by HEIs in South Africa must be transformed to produce transformative agents -learners with digital skills and knowledge of the 4IR. This is the case that digital learners prefer learning with digital tools, are multitaskers and spend most of their time in a digital space [27]. This kind of learners cannot be taught same as learners of the previous industrial revolutions. It seems however, that HEIs in South Africa are faced with conundrum of transforming their pedagogical practice to incorporate 4IR technologies that will make digital learning possible. This is because the South African education discourse raises concerns of unequal and unfair allocation of resources. In the historical account of how digital resources were distributed in South Africa, a point of concern that is often raised is that of digital divide.

In understanding the curriculum congruent to 4IR institutions of higher learning will find some concepts such as connectivism useful.

8. Conclusion

Discussions from various literature above demonstrates that the 4IR time has arrived in Africa and it is an opportunity that the continent has to embrace if it is to move into the future with hope. The 4IR technologies bring much hope in the improvement of African universities'' performance and preparation of students for the future. The debates on 4IR come at an opportune time when African institutions are not only discussing transformation but Africanisation and decolonisation as well. This means African institutions are poised to transform although institutional cultures have to be addressed still. The introduction of 4IR in institutions can never go wrong if there is intent to address historical imbalances, economic growth, structural formation and poverty. Institutions of higher learning should use 4IR to fight many other ills in society including exclusion, inequality and social and epistemic injustices.

Conscientious university leaders need to draw strategies to embrace 4IR not for its sake but for success of students, and the communities served by the communities. The discussion above has also shown the importance of focusing on curriculum, relevant skills as well as knowledge production. If digitalisation is employed carefully it would create jobs and redeem society. Higher education institutions should leave rote learning behind as students are prepared for a future of creativity and development. Furthermore, institutions need to come with curricula that enable graduates to be job creators than job seekers and the potential brough by the multidisciplinary nature of 4IR programmes will enhance this.

South African institutions of higher learning, like several others African states have shown ability to spread the influence of the 4IR as they did during the lockdown due to the COVID-19 pandemic. The chapter acknowledges the positive foretastes of the 4IR technologies in providing unprecedented access to free, open, and high-quality educational resources, which enable people to fulfil the rights to education and learning in contemporary society. Yet, the nature of teaching and learning in HEIs of South Africa has not been effectively transformed via the 4IR technologies. Higher Education Institutions should adapt their methodologies, promoting explicit and consciously reasoned digital strategies that combine optimisation of students and teacher competencies as users, with the generation of new competencies. The literature on curriculum transformation at higher education institutions in South Africa indicates that there are both challenges and opportunities of transforming pedagogical practices. However, if managed correctly, the 4IR will eschew digital divide and avoid recolonisation of Africa through the coloniality of data. Arguably, the 4IR technologies are beneficial to educators and students at the higher education institutions to be residents and role players who are digitally literate, digitally competent, and digitally fluent. Furthermore, they should be able to use digital networks to connect, interact and share knowledge globally.

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