EARLY CAREER RESEARCHERS & DIGITALISATION

Insights from Ghana, Kenya and South Africa

MARCH 2021
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The project on digitalisation in higher education in Africa is an ongoing initiative between Nuffic and the British Council. This report is the outcome of a partnership between Nuffic Neso South Africa and African Network for Internationalization of Education (ANIE). This research was conducted by an intra-Africa research team comprised of Ms Huba Boshoff (Nuffic Neso South Africa), Ms Itumeleng Dhlamini (Nuffic Neso South Africa), Dr Isaac Wiafe (Ghana), Dr Savo Heleta (South Africa), Dr Philip Ayoo (Uganda) and Dr James Jowi (Kenya). The authors thank Dr Priscilla Mensah and Dr Nico Jooste for their valuable inputs as reviewers of the report.

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List of abbreviations

4IR Fourth industrial revolution
CSIR Council for Scientific and Industrial Research
ECR Early career researcher
GDP Gross domestic product
HEIs Higher education institutions
ICT Information and communications technology
OECD Organisation for Economic Cooperation and Development
TVET Technical and vocational education and training

Glossary of key terms

Digitisation is the process of converting physical information into a digital format using digital software and hardware (Burkett, 2017).

Digitalisation is the process that leverages the conversion of information into the digital format to improve organisational systems and processes (Burkett, 2017).

Digital transformation refers to the impact, changes and creation of new value through digitalisation (Burkett, 2017; Gobble, 2018; Bloomberg, 2018).

Digitalisation in higher education refers to the utilisation of digital systems, technologies and infrastructure to improve institutional digital systems and processes. These developments imply developing new teaching, learning and research tools, methods, skills and competencies among the students and staff to facilitate taking advantage of opportunities of a digitalised world (OECD/European Union, 2019: 128).

In this study, early career researchers are PhD candidates, post-doctoral candidates and doctoral graduates who have completed their PhDs within the last five years.
Executive summary

This study was undertaken in Ghana, Kenya and South Africa, with the aim of providing insights into the needs of early career researchers (ECRs) in Africa concerning digitalisation of research, focusing particularly on digital access, perceptions of digitalisation and levels of engagement.

The study focused on early career researchers and the national and institutional environments they operate in to determine their needs, levels of engagement and perceptions with regard to digitalisation.

The study seeks to establish how digital transformation can be approached to ensure it supports early career researchers (ECRs) in Africa and how it can shape their transition towards more established academics, capable of contributing to their institutions and engaging in continental and international collaboration, knowledge creation and development of more sustainable societies. In conclusion we present a visualisation of results that aims to identify the elements of a framework for developing the African digital scholar.

The study was guided by the following objectives:

• Determine the needs of early career researchers as they pertain to digitalisation, in terms of digital access, perceptions and levels of engagement;
• Conduct an analysis of early career researchers’ experiences in digitalisation of research in three sub-Saharan African countries;
• Identify components of a future framework for the African digital scholar.

This study was guided by the following contextual questions:

• What is digitalisation and digital transformation of/in higher education?
• What aspects of digitalisation are specific to the research environment?
• How prepared are African countries and higher education institutions to embrace digitalisation to support research?
• What challenges do early career researchers face in accessing and engaging digital technologies in their research and academic endeavours?
• What strategies, systems, infrastructure, platforms and support structures exist at institutional levels for digitisation of research in Ghana, Kenya and South Africa?
• What are the knowledge, skills and competencies linked to digitalisation in the context of academic research?

The study seeks to establish how digital transformation can be approached to ensure it supports early career researchers in Africa.
1. Key findings

Digital transformation has opened new possibilities for ECRs to network and collaborate with peers around the world, and to participate and present their research at international conferences they could not attend before. They can also attend webinars, seminars and networking events around the world through online and digital modes of academic engagement. At the same time, the ECRs in Africa still value face-to-face engagements and are looking forward to the time when they will be able to travel and engage with their peers in person.

ECRs consider themselves knowledgeable when it comes to searching for data, information and content in digital environments, as well as having skills to organise, store and retrieve content on digital platforms. This knowledge and these skills are important for optimal participation in digital research activities. However, as the literature review shows, ECRs generally require digital skills development for the optimal use of digital platforms and tools for their research activities. Institutions need to provide comprehensive training and development opportunities to ECRs, especially since digitalisation and digital transformation are dynamic and ever-changing processes.

The availability of devices, reliable internet connection and other tools for conducting research and academic work online and via digital platforms remains a challenge for many early career researchers on the African continent. The majority of the respondents in this study indicated that they relied on their own personal devices, such as computers, tablets or phones, for academic and research purposes. Their institutions did not provide them with the devices and facilities they needed to enhance their research especially during the time when, due to the COVID-19 pandemic, they could not use campus facilities, offices, libraries and labs. A number of respondents highlighted that they did not have access to adequate devices to enable them to utilise digital resources and continue with their research projects from home. Going forward, higher education institutions need to invest in, and develop, the necessary digital infrastructure to support young and established researchers and academics.

The review of literature and national and institutional policies in Ghana, Kenya and South Africa shows that the majority of higher education institutions do not have institutional policies and strategies for digital transformation to support and facilitate the integration and utilisation of digital technologies for research, teaching, learning and innovation.

While higher education institutions emphasise the importance of mental health, wellness and well-being of their staff, students and researchers, ECRs who participated in our focus groups highlighted that they hoped their institutions would do more to create an environment that considers and promotes wellness and well-being alongside digitalisation.

ECRs who participated in this study have shown the desire to use digital and technological developments and had positive attitude towards them. At the same time, they have faced a multiplicity of challenges and barriers to utilise digital platforms and tools for research.

ECRs in Africa are mainly employed at universities at the level of lecturers. While it is important for the ECRs to lecture and teach students, lecturing responsibilities can often consume the time that can be spent on research. African universities need to create environments that are research-friendly and enable ECRs to establish themselves as researchers in their fields.

ECRs in Africa still value face-to-face engagements and are looking forward to the time when they will be able to travel and engage with their peers in person.
While the findings cannot be used to generalise the views and perceptions of early career researchers in Ghana, Kenya and South Africa, or on the African continent, they provide an important set of data and findings that can assist us in understanding the needs of early career researchers in Africa as they pertain to digitalisation, in terms of digital access, perceptions and levels of engagement.

The COVID-19 pandemic has amplified the digital transformation processes in higher education in all the case countries. The changes are likely to remain after the pandemic, but possibly in a more hybrid form. Comprehensive digitalisation needs to become a standard feature of institutional strategic plans, with sufficient investment in development and maintenance of digital systems, infrastructure and platforms for teaching, learning and research.

While focusing on ECRs’ experiences, institutional environments and national contexts, the aim of the study was to understand the levels of early career researchers’ engagement with and utilisation and perception of digital platforms and tools that are used for research purposes. The study was conceptualised at the end of 2020 and conducted in the first three months of 2021. It is important to highlight this as at the time the study was conducted, the early career researchers in the three countries under study had been largely operating online for about ten months due to the COVID-19 pandemic and that experience undeniably influenced the findings of this study.

2. Context and literature review

The study has operationalised ECRs to mean and include PhD candidates, postdoctoral candidates and doctoral graduates who completed their PhDs within the last five years. PhD studies and the first few years after the completion of a PhD are a critical period in the research career, characterised by wavering identity between being a postgraduate student and a full-time academic staff member or researcher. This is the time when ECRs face challenges in charting the paths to becoming established researchers in their fields (Vilakazi, 2020). These challenges have been compounded by the global pandemic and the inability to work on university campuses and utilise spaces, laboratories, libraries and other facilities, or to engage, collaborate, network and work with other researchers, academics, scientists and fellow ECRs in person. At the same time, the pandemic has led to changes in the higher education sector globally, with the rapid push for digital transformation and the utilisation of online and digital platforms for work, teaching and learning, academic engagement and research collaboration becoming the norm globally.

As Jensen (2019: 51) points out, even though universities have for years been trying to respond to, and keep up with, the digital transformation in many industries and spheres of life and work, the COVID-19 pandemic has brought to these efforts the urgency that was missing in higher education systems and institutions around the world. The pandemic has also exposed global and regional inequalities in higher education. In some countries, universities were able to transform overnight in early 2020, switching from in-person learning, teaching, assessment, supervision, research and engagement to online teaching, learning and research. In many other countries, and particularly in the global South and on the African continent, universities have struggled to move their activities online due to the lack of capacity, funding and technological infrastructure.
Developing and investing in a new generation of researchers is crucial for any country. African countries need to improve support mechanisms in order to nurture young researchers and academics.

(African Union, 2016: 25)

In April 2020, the Mawazo Institute, a non-profit research institute based in Nairobi, Kenya, conducted a survey of 501 university students and researchers in East, West and Southern Africa on the impact of COVID-19 on their learning and research. A staggering 82.6% of the respondents indicated that they had experienced learning interruptions in the first few months of the pandemic, while 72.5% of the respondents indicated that their lab work or field research had been suspended. Only 38.5% of the respondents indicated that their institutions were offering digital platforms for learning and research. When this data was broken down into the regions, the regional disparities became evident: only 17.2% of West African respondents indicated that their institutions were offering digital platforms for learning and research, compared to 40.5% in Southern Africa and 43.1% in East Africa. These findings show that the pandemic has had a serious negative impact on African higher education and research, and that many African institutions have struggled to switch to digital platforms due to the lack of systems and infrastructure (Mawazo Institute, 2020).

Figure 1: COVID-19 impact
Developing and investing in a new generation of researchers is crucial for any country. African countries need to improve support mechanisms in order to nurture young researchers and academicians (African Union, 2016: 25). ECRs represent the next generation of leaders in scientific research, bringing with them unique expertise, creativity and ideas for the future of research (Termini & Traver, 2020) in Africa. ECRs often have inadequate access to cutting-edge content and resources to support their research, inadequate research funding, poor research infrastructure, poor mentorship and fragmented academic networks to support them in advancing on their paths to becoming established researchers. ECRs also tend to be overstretched, with heavy teaching loads, while research takes a back seat (Warner, Bobo, & Flynn, 2005).

The challenges and drawbacks that the ECRs face – both in general, and in this particular moment, when higher education is experiencing significant changes due to the pandemic and the digital ‘switch’ – need to be explored in more detail and remedied where possible. Digital transformation in higher education and research could contribute to the development of skills, capacities and platforms that would enable Africa’s ECRs to flourish in the future. However, for this to happen, significant investment and support for the development of digital platforms and digital skills are of utmost importance. It is also important to engage with the ECRs and critically assess their experiences with digitalisation to improve processes, systems and platforms.

**Digitalisation and digital transformation**

Though the terms digitisation and digitalisation are often used interchangeably, they do have distinct meanings. Digitisation is viewed as the process of converting physical information into a digital format using digital software and hardware. Digitalisation, on the other hand, leverages the conversion of information into the digital format to improve organisational systems and processes. The impact, changes and creation of new value through digitalisation are referred to as digital transformation (Burkett, 2017; Gobble, 2018; Bloomberg, 2018). Digital transformation can incorporate IT modernisation, digital optimisation and/or creation of new business or organisational models (Gartner, 2021). Drawing from the above, digital transformation refers to transformative changes to ways of life, organisational structures, operations and modes of delivery of products and services through the use of digital technologies (Hess et al, 2016: 124). It encompasses the strategic adoption of digital technologies (Nadkarni and Prügl, 2020: 4) to advance and improve the quality of life and entire systems and structures of organisations.

Digital transformation is important for innovation, diversification of traditional ways of doing things and utilisation of new digital tools, technologies and platforms to improve processes, systems and organisational business models (McKinsey Global Institute, 2019: 5). Digital transformation has great potential to change the world and improve the socio-economic conditions of vulnerable populations. It also has the potential to improve education, research, science and innovation (The African Open Science Platform, 2018: 5). In higher education, digital transformation can include: digital or hybrid delivery of education, reaching students around the world who would not necessarily have to travel for their studies; innovative changes to the institutional management systems and operations; and analysing and disseminating research using digital tools and platforms.

Despite their extensive use around the world, and particularly since early 2020, digital and online technologies in higher education ‘are yet to properly get to grips with matters of learning’ (Castañeda and Selwyn, 2018: 2) and knowledge production. There is a need to critically explore the academic, pedagogical and research use of digital technologies for learning and teaching (Tømte et al, 2019: 100) and methodological and ethical concerns for digitalisation of research. The use of digital transformation to enhance research requires development of new and innovative research.
Digital transformation is important for innovation, diversification of traditional ways of doing things and utilisation of new digital tools, technologies and platforms to improve processes, systems and organisational business models.

(McKinsey Global Institute, 2019: 5)

A strategic approach to digital transformation requires institution-wide planning, conceptualisation and critical engagement about the best way to incorporate digital technologies in learning, teaching, research and engagement at universities (Orr et al, 2020: 19). The effective implementation of digital transformation at institutional level requires the requisite hardware and software, including infrastructure, attitudes, skills, leadership and support systems (Nadkarni and Prügl, 2020: 2; Kane et al, 2015: 3). Ultimately, digital transformation may require a fundamental change of organisational culture and practices at universities (Nadkarni and Prügl, 2020: 25-26).

Digital transformation and research at African universities

African universities have a critical role to play in research and generation of new knowledge and innovations needed to address Africa’s challenges and to spur the socio-economic transformation (Cloete, Bailey & Massen, 2011) needed for Africa’s development and progress. While several transformations have taken place in African universities over the past few decades – such as growth in enrolments, increased number and diversity of institutions and programmes, and reforms in governance and funding (Jowi and Sehoole, 2016) – research has not witnessed significant growth. Africa remains at the periphery of knowledge development due to its low research and innovation capacities (Zeleza, 2012; Jowi & Obamba, 2013). This is at a time of rapid expansion of the universities and while pioneer African scholars are ageing.

Two key continental strategic policy documents speak about the importance of digital transformation. The Continental Education Strategy for Africa: 2016–2025 aims to ‘revitalize and expand tertiary education, research and innovation to address continental challenges and promote global competitiveness’ (African Union, 2016: 25). One of the goals of the strategy is to ‘harness the capacity of ICT to improve access, quality and management of education and
Digitalisation is crucial for functioning and prosperity in the world of tomorrow. As highlighted by the African Open Science Platform (2018: 6), ‘a country that fails to develop its own [digital] capacities will inevitably become dependent upon skills bought in from elsewhere as a passive and ill-informed consumer of expensive data services, lacking the creativity to thrive in a fast-changing world’ (The African Open Science Platform, 2018: 6).

As pointed to by the McKinsey Global Institute (2019: 1), digitalisation has fundamentally changed the world over the past few decades, with some industries experiencing more drastic changes than others. Digital transformation will continue and higher education institutions will have to incorporate digitalisation in their institutional and strategic plans. African universities have to strategically integrate digitalisation into their policies, plans and activities which in most cases would require institution-wide planning to integrate digital technologies in teaching, learning and research activities (Orr et al, 2020: 19). This requires a clear digital transformation strategy and leadership commitment and support (Kane et al. 2015: 3; Castañeda and Selwyn, 2018: 2-3). Most African universities, however, are yet to fully get to grips with comprehensive digital transformation (Castañeda and Selwyn, 2018: 2; Tømte et al, 2019: 100), especially when it comes to the use of digital technologies and platforms for research and innovation.

Digital transformation has far-reaching implications for science, research, education, economic development and societal progress. However, digitalisation in education and research will not benefit all, and particularly the researchers, students and people in low-income countries if it does not follow the principles of open science (The African Open Science Platform, 2018: 4). Open science can transform research and science through digital platforms and technologies ‘to make research more open, global, collaborative, creative and closer to society’ (European Commission, 2020). The work is already underway on the African continent to develop the African Open Science Platform, which would provide scientists, researchers and students with the digital tools and platforms that will assist them ‘in the development of ‘actionable knowledge’ that will lead to socio-economic, environmental and other improvements on the continent, while also strengthening the ‘credibility, practical relevance and socio-political legitimacy of science in and for Africa’ (The African Open Science Platform, 2018: 7).

Effective digital transformation is key if universities are to be ready for advanced digitalisation, also known as the fourth industrial revolution (4IR), which will include technologies such as automation, blockchain, artificial intelligence and virtual reality (McKinsey

A country that fails to develop its own [digital] capacities will inevitably become dependent upon skills bought in from elsewhere as a passive and ill-informed consumer of expensive data services, lacking the creativity to thrive in a fast-changing world

(The African Open Science Platform, 2018: 6)
Global Institute, 2019: 8; Marwala, 2020: 10). The 4IR will have ‘profound implications’ for the African continent, creating opportunities for economic development and growth through modernisation of existing and creation of new industries. To benefit from 4IR, African countries will need to develop new skills, knowledge and competencies among their population. African universities are expected to play a key role in developing skills for the 4IR, as well as developing new knowledge about 4IR (Department of Science and Technology, 2019: 40).

Digital technologies can transform how research is conducted in higher education and open new frontiers for the development of ECRs. Among other things, ECRs need to be equipped with the knowledge, skills and attitudes to utilise technological transformations to enhance their research potential (University of Auckland, 2018: 4). Digitalisation can also be instrumental in fostering international research collaborations (OECD/European Union, 2019: 126) which can offer new opportunities for the growth and global profiling and networking of ECRs. Institutions need to provide ECRs with technical and collaborative tools, technologies and platforms to enable them to collaborate with other researchers around the world (University of Auckland, 2018: 4).

The advancements in digital transformation in higher education present African universities with several possibilities to transform their research and to develop the next generation of talented researchers. According to Wangenge-Ouma and Kupe (2020: 12), digitalisation can enable universities to expand access and enhance research, innovation and community engagement. Developing platforms for ‘digitally enabled open and collaborative innovation’ is key for the future of research at universities on the continent. Through the use of the internet and digital technologies, early career researchers can collaborate with researchers and academics around the world, have access to new research tools and resources, and develop new knowledge using digital platforms (Department of Science and Technology, 2019: 16). ECRs need to have access to the requisite technologies, opportunities for skills development and technical support (Orr et al, 2020: 20) if digitalisation is to make a difference for research at African universities (Jensen, 2019: 17) and minimise the growing technological and knowledge divide in the world (Greener, 2020: 806; Castañeda and Selwyn, 2018: 5).

While digital skills that are required for digital transformation and 4IR can be considered ‘high-level’ skills, many postgraduates and ECRs in Africa are currently struggling with basic IT skills. According to a survey conducted in South Africa in the second half of 2020, 66% of the surveyed research postgraduate students (out of a sample of 5,388 postgraduates from 26 public universities) indicated that they would be more successful in their digital research endeavours if they were provided training in basic computer skills; their university’s learning management system (78% of the respondents); Microsoft Office (81%); email (71%); how to use learning software used by their institution (86%); and effective use of the library resources online (90%) (Department of Higher Education and Training, 2020a: 86). This example shows that a lot of work has to go into digital skills development in higher education on the continent in order to be able to benefit from digitalisation (Department of Higher Education and Training, 2020a: 86).

Country contexts
This section provides country-specific information for Ghana, Kenya and South Africa. This includes the data about higher education systems in the three countries, spending on research and numbers of researchers, as well as statistics on internet use and costs in each country. In addition, this section provides summaries of national and institutional policy contexts for digitalisation in higher education in Ghana, Kenya and South Africa. The three countries have a fairly similar number of public universities and a varied number of private higher education institutions, with South Africa having a
much larger private higher education sector when compared to Ghana and Kenya. Public universities in all three countries enrol the majority of students. South Africa has three times more PhDs than Kenya and Ghana combined. While the three countries have a similar number of public universities, South Africa had more than 22,000 enrolled PhDs in 2017, while Ghana had only 10% of this figure in 2019, and Kenya less than 20% in 2018. The majority of PhDs in each country are enrolled at public universities. The research team had challenges finding reliable figures for postdoctoral fellows hosted by public universities in Ghana, Kenya and South Africa. This could possibly be due to the way in which countries report on postdoctoral numbers. A national and possibly also a central continental (or regional) tracking system could contribute to addressing the lack of data on postdoc figures.

According to the UNESCO Institute of Statistics, Kenya and South Africa spend around 0.8% of their GDP annually on research and development, while Ghana spends 0.4% (it is important to note that the UNESCO Institute of Statistics does not mention the years for their statistics).

The average spending on research and development in sub-Saharan Africa is 0.4%, which is significantly less than the 2.4% average for North America and Western Europe, 2% in East Asia, or 0.7% in Latin America. The African Union has been working with countries to honour their pledges to allocate 1% of their GDP to research and innovation (African Union, 2016: 25). However, while African countries have goals to increase their spending on research and development, this is often not possible due to other pressing priorities.

<table>
<thead>
<tr>
<th>Number of higher education institutions (HEIs)</th>
<th>Student enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public universities</td>
<td>Private HEIs</td>
</tr>
<tr>
<td>Ghana¹</td>
<td>27</td>
</tr>
<tr>
<td>Kenya²</td>
<td>31</td>
</tr>
<tr>
<td>South Africa³</td>
<td>26</td>
</tr>
</tbody>
</table>

Table 1: Higher education system per country

![Figure 2: Spending on research and number of researchers per country](image)

1 National Accreditation Board (2019).
2 Nganga (2019).
3 Essop (2020).
Figures of researchers per country and the gender balance among the researchers show the differences on the national levels. In Ghana, there is a clear urgent need to increase the number of researchers and particularly to focus on supporting female researchers. In Kenya, similarly, there is a need to increase support for female researchers. This breakdown does not distinguish between the career stage of researchers and thus there could be a further disparity between the countries in the gender ratio when considering the number of female versus male researchers in the early career stage versus established researchers.

<table>
<thead>
<tr>
<th>Share of the population using the internet (2016)</th>
<th>Ghana</th>
<th>Kenya</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.6%</td>
<td>16.6%</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>Number of people using the internet (2016)</td>
<td>9.78 million</td>
<td>8.04 million</td>
<td>30.25 million</td>
</tr>
<tr>
<td>Mobile phone subscriptions per 100 people (2017)</td>
<td>127.4</td>
<td>86.1</td>
<td>162</td>
</tr>
<tr>
<td>Average cost of 1GB of mobile data, in US dollars (2020)</td>
<td>US $0.94</td>
<td>US $1.05</td>
<td>US $4.3</td>
</tr>
</tbody>
</table>

Table 2: Internet use and costs per country

The data on the share of population using the internet shows that in Kenya, only a small segment of the population has access to the internet, while in Ghana just over a third and in South Africa just over half of the population have access to the internet. Similar differences are evident when the numbers of people using the internet per country are taken into consideration. Mobile phone subscriptions, on the other hand, indicate that the majority of the population in each country has access to mobile phones. Finally, the data for the average costs of mobile data show that South Africa has a long way to go to make data affordable to its citizens. All this is highly relevant to the discussion about digitalisation in higher education and research, as digitalisation requires affordable and stable internet connections.

**GHANA**

**National policy context for digitalisation in Ghana**

The main policy guiding the digitalisation space is the Integrated ICT for Accelerated Development (ICT4AD) policy (Ghana Ministry of Communications, 2003) which aims to realise the vision of transforming Ghana into an information-rich knowledge-based society and economy through the development, deployment and exploitation of ICT within the country. The policy acknowledges the need for Ghana to integrate ICT in its education sector and advocates for the promotion of ICT in education, research, scientific and industrial capacity development. Ghana’s Poverty Reduction Strategy Paper (GPRS I&II), the Education Strategic Plan 2003–2015, the 2008 ICT in Education policy and the 2011 Basic School Digitalization Policy, are amongst the key policy documents on ICT that further support a digitalisation agenda.

However, these policy documents do not present the explicit activities and guidelines on digitalisation for research activities. In addition to the recently developed Public University Bill, the policies do not include strategies to utilise ICT and digitalisation to facilitate the development of early career researchers. Rather, they provide generic guides on how to advance ICT research and use ICT tools for teaching and learning. The policy is silent on ICT and digital platforms as research tools. It can be concluded that although there are general ICT related policies in Ghana, they do not focus on digitalisation of research and that higher education institutions are left in a policy vacuum.

**Institutional context for digitalisation in Ghana**

Although there are national institutions such as the Council for Scientific and Industrial Research (CSIR) that promote research, public universities are significant contributors of scientific research in Ghana. This could be attributed to the recent promotion criteria adopted by public universities that emphasise research and publications as primary criteria for promotion. Some universities have also begun to use online visibility of academic staff as a criterion for performance evaluation. This demonstrates the extent to which Ghanaian universities acknowledge the relevance of digital scholarship. However, the level of support provided to researchers, particularly ECRs, is still far from adequate. While almost all universities in Ghana have policies that seek to promote digitalisation, these policies do not include support for ECRs in their growth as researchers. Attention is mainly given to the provision of platforms that support
teaching and learning. Although the lack of policy may not necessarily translate to lack of interest, activities or plans to support digital scholarship, it has been argued that the digital agenda of an academic institution has a significant impact on academics’ and researchers’ digital actions (Quaicoe & Pata, 2018).

KENYA
National policy context for digitalisation in Kenya

Among African countries, Kenya has made commendable progress in utilisation of ICT not only in education but in most facets of life. According to Chakravorti and Charturvedi (2017), Kenya’s digital economy has emerged as the fourth-fastest-growing in the world after China, Malaysia and Bolivia. Kenya’s Vision 2030 puts research and knowledge generation in a more elevated position than ever before, with ICT having a central position in achieving the vision. The Ministry of ICT develops and implements ICT policies, while the Communications Authority of Kenya regulates the ICT sector. Kenya has also developed new national key strategic documents including the National ICT Masterplan and the National Broadband Strategy, the Access to Information Act and the Data Protection Bill.

Examples of investment in infrastructure that support the ICT vision includes the roll out of the national fibre optic backbone infrastructure and the 4G mobile networks. These infrastructure investments, crucial for digitalisation, are complemented by the implementation of digital learning in the education system.

Kenya has made commitments and investments to position itself into the future of the digital revolution with the digital economy and e-commerce taking a centre stage. Kenya’s leading role in mobile money transfer innovations commonly known as Mpesa, has transformed financial transactions almost globally. The upsurge in smartphone ownership and the attendant use of social media has opened up many possibilities. According to Ndung’u, Lewis and Mothobi (2019), Kenya needs to strengthen policies and strategies to guide the growth of the digital economy and address the several challenges that may negate the gains already made. Some of these challenges include skills deficits, cost of internet, weak policy and regulatory frameworks.

These challenges need to be addressed to enhance maximisation of the opportunities presented by these transformations.

Institutional context for digitalisation in Kenya

According to Nganga (2019), Kenyan universities emerged top in an East African survey on the adoption of ICT in teaching and learning with a focus on use of websites and other digital platforms, subscription to academic journals, use of intranet, social media and other e-learning tools. Still, the COVID-19 pandemic caught most Kenyan universities unprepared to move their teaching, learning and research online. While a number of universities have moved quickly and embraced online provision of learning (Wachira & Ombati, 2020), challenges persist in the higher education system and in many institutions, which further perpetuate the persistent knowledge divide and keep young African researchers at the periphery of the global knowledge society.

SOUTH AFRICA
National policy context for digitalisation in South Africa

The Department of Science and Innovation’s Strategic Plan 2020–2025 highlights that, in order to build responsive training, education, innovation and research systems capable of addressing social, economic, environmental and other challenges, South Africa requires digital skills and capabilities for research and innovation (2019: 41). To have a ‘digital advantage’ in the 21st century, South Africa must expand the ICT infrastructure and digital transformation in the education sector, the economy and government services. Digital advantage will be key if the country is to take part in, and benefit from, advanced digitalisation (Department of Science and Technology, 2019: 17).

In 2020, the South African Department of Communications and Digital Technologies (2020: 9) developed a ‘National Digital and Future Skills Strategy’. The aim of the strategy is to coordinate the development of digital skills in South African society, from the basic education level to colleges and universities, and among the labour force and citizens. The Department of Higher Education and Training (DHET) and public universities in South Africa are envisioned as playing a major role in the implementation of the strategy and the development of digital skills and competencies in the country. Development of advanced digital skills will be the responsibility of DHET, universities and the Technical and Vocational Education and Training (TVET) sector, as well as the Department of Science and Innovation, which is tasked with the development of digital skills for scientific research, technology and
innovation (Department of Communications and Digital Technologies, 2020: 3).

While the Department of Higher Education and Training’s Strategic Plan 2020–2025 does not see digitalisation or digital transformation of South African higher education as a priority, it has recognised blended and online learning as key for expanding access based on the enrolment plans developed by the institutions for the 2020 to 2025 period (Essop, 2020: 15). The Department of Higher Education and Training (2020: 29) plans to invest in development of lecturers’ capacity to utilise digital technologies and pedagogies for innovation in teaching and learning.

Institutional context for digitalisation in South Africa

A review of official institutional strategic plans, transformation plans, and other policy documents conducted in January 2021 as part of this study shows that a few of the 26 public universities in South Africa have an explicit publicly available digital transformation or digitalisation strategy. Strategies are mostly embedded in the research policy or ICT strategy. To benefit from digitalisation, universities must explicitly incorporate digital transformation in the research, teaching and learning plans and frameworks.

Before 2020, the majority of universities had been slow to provide online and blended learning (Wangenge-Ouma & Kupe, 2020: 10). This, however, changed with the outbreak of COVID-19 pandemic. The switch to online learning in South Africa further exposed the inequalities in the higher education system, both between and within the institutions and even amongst students of various backgrounds.

While some universities managed to move quickly to online learning, others struggled due to technology challenges, deficient staff capacities, poor infrastructure and challenges of access to the internet. In most cases, students from low-income backgrounds have struggled to participate in learning, teaching and research activities mainly due to the lack of devices and access to the internet (Wangenge-Ouma & Kupe, 2020: 10–11).

While digital transformation is key for the future of South African universities, the institutions must expand their ICT infrastructure to take part in, and benefit from, digital transformation, including its new developments such as the 4IR (Department of Science and Technology, 2019: 17). These developments open new possibilities for higher education institutions especially for teaching, learning and research. At the same time, these developments create challenges, particularly for the institutions that lack sufficient funding for investment in the latest infrastructure, technologies and platforms (Council on Higher Education, 2020: 15). Wangenge-Ouma and Kupe (2020: 12) highlight that addressing many of the challenges experienced during the COVID-19 pandemic requires ‘a sector-wide strategy, as opposed to fragmented, individual, institutional interventions.’

This is particularly the case for the advanced digital technologies that are part of the 4IR, such as virtual reality and augmented reality, which can provide immersive learning online at scale, while possibly lowering the cost of university education. For example, through the development of virtual reality technologies at the national level, South African universities can share virtual laboratories for their learning, teaching and research.

**The switch to online learning in South Africa further exposed the inequalities in the higher education system, both between and within the institutions and even amongst students of various backgrounds.**
3. Research methodology

This descriptive study utilised a mixed-methods design that included a combination of qualitative and quantitative approaches. This, according to Teddlie and Tashakkori (2009), assists researchers to seek answers to their research questions from different but complementary perspectives and the use of several methods and approaches. It also describes the analytical framework, data collection and analysis processes.

**RESEARCH QUESTIONS**

This study was guided by the following contextual questions:

- What is digitalisation and digital transformation of/in higher education?
- What aspects of digitalisation are specific to the research?
- How prepared are African countries and higher education institutions to embrace digitalisation in support of the research agenda?
- What challenges do early career researchers face in accessing and engaging with digital technologies in their research and academic endeavours?
- What strategies, systems, infrastructure, platforms and support structures exist on institutional levels for digitisation of research in South Africa, Kenya and Ghana?
- What are the knowledge, skills and competencies linked/related to digitalisation in the context of research?

**LITERATURE REVIEW**

The literature review focused on digitalisation of the research environment. Furthermore, national and institutional approaches to digitalisation in higher education and research in Africa were included in the scope of the literature review. The desktop review of published articles and reports, strategic plans and policy documents also investigated key concepts, namely digitalisation in/for higher education; digitalisation and research, as well as digital transformation.

**COUNTRY CONTEXTUALISATION**

Three countries in three regions of the African continent were selected for this study, namely Ghana, Kenya and South Africa. This step in the research comprised an analysis of the national policy context as it pertains to digitalisation and a desk review of institutional policies of higher education systems and institutions that have reference to digitalisation.
In addition to data collection through traditional methods, the research team undertook a design thinking process to develop a better understanding of ECRs views on being a digital scholar.

The design-thinking process is characterised by five phases.

- **Phase 1 (Discovery) and Phase 2 (Interpretation)** were largely covered by the desktop review and information gathered through the survey and focus groups. These first two phases were shared with the workshop participants as contextualisation.

### ANALYTICAL FRAMEWORK

The study adopted an analytical framework which provided three main categories of analysis which were aligned to the study objectives and research questions. These included:

- **Country analysis**: The study considered socio-economic and higher education contexts of the case countries – Ghana, Kenya and South Africa; the national research infrastructure; the national ICT/digital infrastructure; and review of national strategic plans and policy context for ICT and higher education in relation to digital transformation;

- **Institutional perspectives**: We considered institutional environments, including institutional policies, plans and monitoring tools; ICT, digital and research infrastructure and management; review of institutional strategic and transformation plans in relation to digital transformation in public and private universities in the selected countries;

- **Individual personal needs of ECRs**: The study considered relevant personal attributes of the ECRs, including their socio-economic backgrounds, ICT and digital skills, opportunities for digital access, perceptions, and levels of engagement demonstrated by ECRs from the selected countries.

### DATA COLLECTION AND ANALYSIS

**A: Collection**

The country analysis served as a first level of data collection. Further data collection methods included an electronic survey, focus group interviews and a design-thinking workshop.

The survey was electronically distributed through convenient sampling, considering diverse academic backgrounds, diversity in institutions and phase within the definition of ECRs. The survey was also distributed via social media channels of the organisations involved in the study.

The survey covered a range of questions that were aimed at understanding the level of engagement, perceptions, experience and challenges encountered by ECRs as they pertain to digitalisation. The survey also captured demographic indicators such as age, gender, discipline and status of employment.

**Focus group discussions** – Two focus group discussions per country were conducted to further explore issues that emerged from the survey results. These topics included exploring the impact of digitalisation on the research process and the well-being of ECRs. The focus groups also explored the digital transformation process...
This study did not undergo an ethical clearance process on either institutional or national level. The time associated with obtaining such clearance in each country would have negatively impacted the data collection.

The process of data collection was designed to ensure adherence to ethical research standards, including confidentiality of the responses and anonymity of the respondents. Participation was voluntary and informed consent was requested from all participants in the survey process. Detailed information concerning the assessment, purpose and objectives of the study was shared before consenting to participate. No personal data was collected unless respondents requested follow up.

Participants in focus groups were informed of a recording taking place and that no personal identifiers would be used in the study report. All participants consented to the recording.
4. Findings

Respondent characteristics

The survey was administered in February 2021. A total of 200 responses were received after administering a questionnaire using SurveyMonkey online survey tool. Convenience sampling techniques targeting early career researchers were adopted to collect data in all three selected countries. As detailed in the research methodology, the quantitative data collection was combined with focus group interviews undertaken in the selected countries.

The Figures below provide an overview of the responses received, based on key indicators such as age, gender, field of study, level of employment and number of years involved in academia. In the analysis of data, only the fully completed responses were included.

The distribution of responses between the selected countries was: Ghana (108); Kenya (51) and South Africa (37). A few respondents under ‘other’ are citizens of these countries who are currently studying for their PhDs in other countries. The respondents were composed of 65.5% males and 32.5% females, with 2% of the respondents selecting ‘other’.

![Figure 3: Gender distribution of respondents](image)

![Figure 4: Number of responses per county](image)
The responses show that more than half (58.5%) of the respondents were enrolled for a PhD, with a further 26.5% having obtained their PhD in the past five years. On analysing the ‘other’ responses, three respondents indicated that they received their PhD within the past eight years, and additional two respondents indicated that they were in the process of enrolling for a PhD. These responses were included in the study. Elsewhere, early career researchers are considered to be people who have completed their PhDs in the past eight years (Arts and Humanities Research Council, 2021). The respondents who are in the process of enrolling for their PhDs are already young academics at their institutions, involved in both teaching and research, and as such should be considered as ECRs. The additional ‘other’ responses could be an indication of the differing interpretation of the term ‘early career researcher’.

This is particularly interesting when looking at the age brackets, with just over 10% of the respondents in the age bracket over fifty years of age. This indicates that age does not necessarily define ‘early career researchers’, but their enrolment in or completion of a PhD, which, in the case of some people, happens at a later stage of life and academic career.

Most of the ECRs were employed at universities at the level of a lecturer, with almost 60% of the respondents in their current positions for more than three years. Other respondents were either PhD candidates or recent graduates who are employed as professional staff at universities, work in public service, or have their own business.

While it is important for ECRs to lecture and teach students, lecturing can often reduce the time...
spent on research. As will be noted later, in the discussion of the findings from our focus groups, ECRs surveyed for this study referred to heavy teaching loads that do not leave much time for research activities. This has also been explored in other studies (Warner, Bobo, & Flynn, 2005) and indicates that young researchers on the African continent often do not have time to focus on research due to their teaching responsibilities.

**Status as an Early Career Researcher?**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.5%</td>
<td>Obtained PhD in the last 5 years</td>
</tr>
<tr>
<td>2.5%</td>
<td>Postdoctoral Fellow</td>
</tr>
<tr>
<td>58.5%</td>
<td>Enrolled for a PhD</td>
</tr>
<tr>
<td>12.5%</td>
<td>Other</td>
</tr>
</tbody>
</table>

Figure 7: Number of responses on status within definition of “Early career researcher”

**Employment Level in Academia**

- **12.5%** Senior Lecturer
- **30.5%** Lecturer
- **16.5%** Assistant/Junior Lecturer
- **0.5%** Postdoctoral Fellow
- **6%** Tutorial Fellow
- **8%** Other
- **26%** Not Applicable

Figure 8: Position in academic employment

**Summary and discussion**

As mentioned earlier, this study explored the extent to which ECRs utilise digital platforms and tools to enhance their research activities. The study also sought to understand the factors that promote ECRs’ use of digital tools for research. The study further explored the national and institutional contexts in Ghana, Kenya and South Africa and the individual characteristics and predispositions of the ECRs and how that impacted on their growth as researchers. Based on the research methodology and analytical framework described above, the section below presents the findings from the survey and focus groups.

**INSTITUTIONAL ENVIRONMENTS AND SUPPORT SYSTEMS**

A supportive and facilitative institutional environment is crucial to assist ECRs in their development as researchers. The need to provide appropriate ICT and digital infrastructure and support to staff, researchers and students is highlighted in the Continental Education Strategy for Africa: 2016–2025 (African Union, 2016: 23).

Nearly all respondents in this study (90%) reported that they relied on their own devices such as computers, tablets or phones for academic and research purposes. Their institutions did not provide
them with the devices and facilities they needed to enhance their research, particularly during the COVID-19 pandemic and lockdowns, when ECRs could not use campus facilities, offices, libraries and labs. Institutions in the three countries need to build the infrastructure and resources needed by ECRs and other researchers. Only 26% of respondents indicated that they had access to devices at the institution to enable them to utilise digital resources and continue with their research projects from home.

**Figure 9: Use of own devices vs university facilities**

Regarding the costs, 26% of the respondents found digital research to be too expensive. Another 37% of the respondents indicated that they could not afford to do research via online and digital platforms, while 34% would not be able to engage in digital scholarship without the support of their university. This shows that early career researchers require institutional support if they are to function optimally in the digitalised research space. It is important to note that these findings are heavily influenced by the experiences during the COVID-19 pandemic and the inability of ECRs to utilise university facilities, offices and labs for research purposes.

**Table 3: Responses to affordability and cost of digital technology in research**

<table>
<thead>
<tr>
<th>Response</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cost of using digital technologies is too much for me to bear when compared to traditional methods of doing research</td>
<td>31%</td>
<td>24%</td>
<td>19%</td>
<td>12%</td>
<td>14%</td>
</tr>
<tr>
<td>Without the support of my university, I cannot practice digital scholarship</td>
<td>24%</td>
<td>21%</td>
<td>22%</td>
<td>13%</td>
<td>21%</td>
</tr>
<tr>
<td>I can afford the cost involved in doing research and other academic work using online and digital platforms</td>
<td>15%</td>
<td>23%</td>
<td>28%</td>
<td>19%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Table 3: Responses to affordability and cost of digital technology in research
ECRS’ COMPETENCIES AND LEVELS OF ENGAGEMENT

The competencies, perceptions and attitudes of the ECRs towards ICTs and digital technologies have a bearing on their user behaviours, including ease and frequency of usage of these platforms and tools for research and scholarly activities. ECRs with adequate competencies, skills and attitudes are more likely to effectively use these transformations to perform academic activities that extend their existing knowledge (Pearce, Weller, Scanlon & Kinsley, 2010; Weller, 2011). This is in addition to the environment and context in which the ECRs find themselves (Wiafe, Nakata, & Gulliver, 2014) and the support provided to them (Fogg, 2009; Koranteng & Wiafe, 2019). The majority of respondents confirmed positive consideration of ICTs and digital transformations taking place at their institutions. While they found them timely, useful and convenient, some respondents indicated that they were not equipped with the skill sets to enable them to fully utilise and benefit from these developments.

DIGITAL SKILLS OF ECRS

The survey results provide a snapshot of the self-assessment of respondents in terms of their ability to engage with digital aspects of research, particularly in terms of research processes and activities. Table 4 indicates that most respondents (over 75%) perceived themselves as knowledgeable or experts in searching for data, information and content in digital environments. Equally, over 70% of the respondents had the requisite skills to organise, store and retrieve content on digital platforms. Two skills that were significantly lower were the ability to use reference management software and identify open license material.

Table 4: Self assessment of digital skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Novice</th>
<th>Advanced Beginner</th>
<th>Competent</th>
<th>Proficient</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulate information needs online</td>
<td>2%</td>
<td>7%</td>
<td>28%</td>
<td>43%</td>
<td>21%</td>
</tr>
<tr>
<td>Search for data, information and content in digital environments</td>
<td>1%</td>
<td>3%</td>
<td>21%</td>
<td>44%</td>
<td>33%</td>
</tr>
<tr>
<td>Analyse, interpret and critically evaluate data collected online</td>
<td>2%</td>
<td>6%</td>
<td>30%</td>
<td>36%</td>
<td>27%</td>
</tr>
<tr>
<td>Organise, store and retrieve content on digital platforms</td>
<td>2%</td>
<td>7%</td>
<td>20%</td>
<td>46%</td>
<td>27%</td>
</tr>
<tr>
<td>Use reference management software (e.g. Mendeley, Endnote)</td>
<td>13%</td>
<td>17%</td>
<td>16%</td>
<td>26%</td>
<td>30%</td>
</tr>
<tr>
<td>Identify open license materials (e.g., Creative Commons)</td>
<td>13%</td>
<td>17%</td>
<td>23%</td>
<td>25%</td>
<td>23%</td>
</tr>
<tr>
<td>Check the history of a Wikipedia article</td>
<td>15%</td>
<td>23%</td>
<td>22%</td>
<td>22%</td>
<td>19%</td>
</tr>
</tbody>
</table>
Table 5 gives insight into the tangible skills that ECRs had used in the research processes and activities. The tasks indicate a similar level of expertise in most of the activities with only the use of gaming and/or simulation not falling within the expertise possessed by respondents.

<table>
<thead>
<tr>
<th>Response to use of digital tools in research</th>
<th>Novice</th>
<th>Advanced beginner</th>
<th>Competent</th>
<th>Proficient</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create and report a chart or infographic from data</td>
<td>18%</td>
<td>16%</td>
<td>22%</td>
<td>28%</td>
<td>18%</td>
</tr>
<tr>
<td>Identify patterns and trends in data</td>
<td>11%</td>
<td>16%</td>
<td>23%</td>
<td>28%</td>
<td>24%</td>
</tr>
<tr>
<td>Judge the credibility of statistics used in public debates</td>
<td>13%</td>
<td>14%</td>
<td>28%</td>
<td>31%</td>
<td>15%</td>
</tr>
<tr>
<td>Pose a question online and collect ideas from experts or professionals</td>
<td>14%</td>
<td>17%</td>
<td>28%</td>
<td>26%</td>
<td>15%</td>
</tr>
<tr>
<td>Create and carry out an online survey</td>
<td>19%</td>
<td>16%</td>
<td>21%</td>
<td>25%</td>
<td>20%</td>
</tr>
<tr>
<td>Use a game or simulation to explore a real-world problem</td>
<td>44%</td>
<td>19%</td>
<td>20%</td>
<td>13%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 5: Responses to use of digital tools in research

As shown in Figure 10, the majority of respondents had participated in online discussions, and over half of them had designed online polls or quizzes, made notes on digital materials, and shared ideas with other researchers using digital and online platforms. Nearly half of the respondents had experience with collating web resources for others to use, while 27.5% had experience in creating a video or animation and sharing this online.

This shows that, while many respondents had practical experience with different online and digital activities that could facilitate and enhance academic and research collaboration, there were still those who required support, training and/or devices in order to be active in digitalised research spaces.

The results indicate that just over 50% of the respondents had experience with giving feedback to other researchers online. While 63.5% of the respondents had used online platforms such as Zoom and Microsoft Teams for meetings and research collaboration, 57% had worked collaboratively on documents via online and digital platforms. Interestingly, only 33.5% of respondents reported that they had participated in international research and collaboration via online and digital platforms, which shows that ECRs on the African continent still have some way to go in this respect.
When asked how often they used different online and digital platforms and tools for research purposes, respondents highlighted video conferencing platforms (85.5%), apps such as WhatsApp (71%) and websites such as ResearchGate, LinkedIn and Google Scholar (70%). Twitter and Facebook were not used much by the majority of the respondents for research purposes, with only 28.5% respondents selecting these.

ETHICAL ISSUES AND DIGITAL SAFETY

The rapid growth in the use of ICTs and digital technologies has also been accompanied by several risks and challenges, which put digital safety and ethics at the forefront more than ever before. There are ethical guidelines, values and practices that govern the utilisation of these
technologies and which must be respected at all times. Reinares-Lara, Olarte-Pascual, and Pelegrín-Borondo (2018) observe that moral values affect users’ intention towards technology use. Moreover, there is evidence that ethical concerns affect social interactions (Nadeem, Juntunen, Hajli, & Tajvidi, 2019; Moghavvemi, Sharabati, Klobas, & Sulaiman, 2018) and are crucial in online interactions and technology use behaviour.

Whereas the findings confirmed that there was a significant relationship between ECRs’ ethical concerns and their perception of receiving social support from online platforms, the relationship between ethics and their perception of providing social support was not significant. Most of the respondents reported not having ICT support from their institutions. They reported, however, that they protected their devices using strong security systems mostly through their own initiatives. This suggests that they had serious security concerns with the systems that they used. Those who had adequate competencies and considered themselves as digital scholars often support their colleagues who encounter technical challenges.

Even though ECRs face these digital security challenges, for many, their institutions did not accord them the support they required. The support they received from colleagues and other providers was useful in enabling them to evade some of the digital security challenges. Some of the respondents reported challenges with their personal privacy, especially with virtual meetings in circumstances where they had forgotten they were in virtual setups and visible to others in the meeting.

<table>
<thead>
<tr>
<th>Responses related to safety</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I rely on the IT services department to keep my data safe</td>
<td>23%</td>
<td>21%</td>
<td>28%</td>
<td>17%</td>
<td>12%</td>
</tr>
<tr>
<td>I follow IT services guidance on secure use of institutional computers and data</td>
<td>12%</td>
<td>13%</td>
<td>22%</td>
<td>24%</td>
<td>31%</td>
</tr>
<tr>
<td>I protect all my devices and data with strong passwords and security settings</td>
<td>1%</td>
<td>4%</td>
<td>12%</td>
<td>24%</td>
<td>59%</td>
</tr>
<tr>
<td>I understand and appreciate ethical use requirements – netiquette, copyright, attribution, etc.</td>
<td>1%</td>
<td>4%</td>
<td>15%</td>
<td>25%</td>
<td>56%</td>
</tr>
</tbody>
</table>

Table 8: Responses related to safety

<table>
<thead>
<tr>
<th>Responses related to behaviour</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I manage privacy settings carefully on any social media/ social network platform I use</td>
<td>6%</td>
<td>8%</td>
<td>25%</td>
<td>24%</td>
<td>39%</td>
</tr>
<tr>
<td>I check how I appear in web searches and on digital media</td>
<td>10%</td>
<td>10%</td>
<td>26%</td>
<td>32%</td>
<td>23%</td>
</tr>
<tr>
<td>I keep tagged photos and locations private, or share only with close friends</td>
<td>13%</td>
<td>11%</td>
<td>18%</td>
<td>24%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Table 9: Responses to behaviour
ECRs’ intention to continue using digital technologies for research was observed to be determined by their levels of engagement in collaborative activities. This suggests that when researchers collaborate using digital technologies, they form intentions to continue using these tools and platforms due to the benefits that these technologies provide. Indeed, digital technologies support collaborative work across countries and continents without the need to travel (Baumber, Metternich, Ampt, Cross & Berry, 2018). From the country level analysis, these assumptions were supported by Ghanaian and Kenyan researchers, but not by South Africans. This is surprising because South Africa has a higher digital technology penetration rate (55.5%) than Ghana (46.5%) (Internet World Stats, 2021). It was expected that more ECRs in South Africa would have experienced the affordances enabled by these technologies, which would inform their intentions for continuous usage. Future research attention needs to focus on these targeted areas to understand researchers’ behaviour in their use of digital technologies for academic activities.

Perceived ease of use and perceived usefulness of digital platforms for research did not influence researchers’ engagement in collaborative research activities. Perceived ease of use defines the extent to which researchers find it easy to use digital technologies, while perceived usefulness describes the extent to which digital technologies are perceived to be effective for performing academic activities. It is possible that ECRs’ behaviour on digital platforms is not informed by ease of use and usefulness. Other studies have also found that perceived ease of use does not inform technology use behaviour (Wiafe, Koranteng, Kastriku & Gyamera, 2020).

Given that similar findings on perceived ease of use and perceived usefulness were observed across the three countries, it can be concluded that due to the pervasiveness of digital technologies, the concepts of ease of use and usefulness are not more decisive in predicting ECRs behaviour towards digital scholarship activities.

While it was expected that when ECRs perceive themselves as digital scholars, they would be engaged in collaborative activities using digital technologies, the findings suggest otherwise. It is observed in the survey data that ECRs used digital technologies to provide support to others. Therefore, most researchers preferred to answer questions and provide feedback and other forms of support to others instead of collaborating via digital technologies. Perhaps this lends credence to the earlier arguments that there is still some level of preference for in-person collaboration. Also, it can be inferred that the majority of ECRs in the three countries under study were engaged in teaching activities, which meant that a lot of their online activities were geared towards information provision and teaching rather than using these platforms for scholarly research activities. ECRs’ perception of digital scholarship was determined by competence and expertise. This presupposes that when they believe that they have the competence and expertise to use digital technologies for academic activities, they perceive themselves as digital scholars. Given that online engagement in higher education has become the norm since early 2020, most ECRs have been equipped with the skills and technical know-how to use digital technologies. This boost in their confidence increases researchers’ perceptions of being digital scholars.

### Table 10: Respondents view on role of digitalisation in their future research processes

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Frequently</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will continue to use digital technologies and platforms to support my research activities</td>
<td>1%</td>
<td>1%</td>
<td>9%</td>
<td>22%</td>
<td>68%</td>
</tr>
<tr>
<td>I plan to digitise all my research activities in the near future</td>
<td>3%</td>
<td>3%</td>
<td>15%</td>
<td>27%</td>
<td>53%</td>
</tr>
<tr>
<td>I am planning to stop using most of the digital technologies that support research</td>
<td>74%</td>
<td>9%</td>
<td>5%</td>
<td>5%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Respondents view on role of digitalisation in their future research processes
Focus groups

THE SHIFT ONLINE

The COVID-19 pandemic has amplified digital transformation in most of the institutions that were represented by respondents in the study. The majority of respondents felt that these transformations might stay with the institutions even beyond the COVID-19 period especially due to their inherent benefits to the academic and research projects. A respondent recounted how they had previously made attempts to adopt technologies in teaching and learning with very meagre success. This was turned around by the pandemic. The COVID-19 pandemic may go down in history as a key turning point in most institutions that led to comprehensive digital transformation.

In South Africa, while many institutions had been trying over the years to move some of their learning and teaching online, almost all university activities moved online after March 2020 with the onset of the COVID-19 pandemic. In Kenya and Ghana, though some universities had already started making efforts to integrate ICTs in teaching, learning and research, the pandemic caught most unprepared and halted teaching and learning for a couple of months. Most of them made attempts under challenging situations to adapt to online learning. This had some impact on the teaching and learning processes in the countries, and it also assisted some ECRs to continue with their research activities.

Respondents were of the view that digital platforms added value to the institutions and to their research as ECRs. They noted that the changes made during the pandemic were likely to stay with the institutions after the pandemic, but possibly in a more hybrid form. Some participants pointed out that face-to-face learning, research activities and other engagements at universities are key for networking and socialising and that we should not expect that everything will remain online forever. However, they thought that it would be important if students and young researchers continued to embrace digital modes of learning, which would assist them in development of useful skill sets.

A number of respondents reported that their institutions had invested in software and hardware infrastructure which enabled the ECRs to quickly transition to online learning and engagement. This was more evident in South African and some Kenyan institutions. In Kenya, the respondents reported the steps taken by universities to connect their libraries and other online resources, which has strong possibilities to support research and ECRs.

DIGITAL ACCESS

ECRs, especially from less endowed institutions and who did not have requisite ICT and digital skills, indicated that they gained immensely during 2020 when their institutions moved partly or fully online by acquiring some of the basic skills they needed to operate in the digital environment. Apart from ICT and digital skills, they also learnt other essential skills such as working and engaging with people from other cultural backgrounds. They enhanced their self-discipline and etiquette especially during online events and engagements, and improved their time management while working via digital platforms. ECRs also enhanced their capacity to work more independently as they were physically isolated from colleagues and supervisors. They highlighted that these skills would be very useful for the world of work in the future.

A number of participants highlighted that, with universities around the world moving online due to the pandemic, ECRs could now attend more academic conferences, workshops and other networking events with peers than ever before. For researchers in Africa, such conferences and workshops were usually beyond reach due to the high costs required for travel and participation, as well as difficulties in obtaining visas for some countries. Digital transformation has opened new possibilities for young researchers to participate and present their research at international conferences they could not attend before. This means that the ECRs could now find more possibilities for collaborations, networking and sharing experiences through these new modes of academic engagement.

Despite these developments the ECRs still valued face-to-face engagements and did not feel that the online engagements could forever replace these. One participant said,

‘There are a lot of opportunities being advertised, but I am not necessarily interested in virtual engagements. I would like to participate and network with other people in person.’

(Respondent, South Africa)

DIGITALISATION AND RESEARCH

The literature review documents the immense role of ICTs and digitalisation in enhancing research and international research collaboration, and the
potential this has for the growth of ECRs. A key outcome of the study, and something that was raised by participants in the focus groups, is that digitalisation has created both the flexibility and the access to more research opportunities for the ECRs than ever before. It enables them to find viable solutions to perennial research challenges such as the high cost of conducting research, especially reaching out to key informants who may be located far away from the ECRs.

The participants added that there was a need to review data collection protocols and processes and align them to the new realities of doing research online and via digital platforms.

One participant highlighted that moving research work online required development of specific skills for independent work, which many researchers did not yet possess. Another participant said, “All of us had to undergo learning since the pandemic began, moving from conventional in-person learning and research, to going fully virtual. Key here is self-discipline for independent work and not everyone is able to do this properly. I do not see this being addressed by the institutions.”

DIGITALISATION, WELLNESS AND WELL-BEING

Participants in focus groups pointed out that there were a significant number of postgraduates and early career researchers who had been struggling with the move online during the pandemic in terms of mental health, well-being and emotional challenges. One participant said, ‘I found that going mostly virtual [with meetings, work, engagements, webinars and conferences], there were a lot of times [in 2020] when I felt completely overwhelmed and drained. I think part of this was that, at least for me during virtual meetings, you get the energy drain of having to engage with people (and I am a little bit of an introvert)... [at the same time] you don’t get the energy back. For example, if I go to three virtual meetings per day, I would find that more draining in a way than going to three meetings in person. When you are there in person, you get these softer interactions and nuances... which you do not get from virtual meetings.’

For some participants, working online or via digital platforms seemed to be non-stop, without a break. They also noted that work days seemed to be longer, as they were always connected and available online. One participant noted that his personal learning and growth in 2020 had been realising how many virtual meetings per day were enough, and how many were too much in order to preserve energy and be able to function and do other work.

Another participant spoke about frequent digital fatigue and feeling overwhelmed due to the lack of boundaries when it came to where work and research activities started and ended while working from home. In addition, not being able to see colleagues and engage with them in person created a void for the participant. A number of participants said that they hoped the institutions would do more to create an environment that considers and promotes wellness and well-being alongside digitalisation, both on paper and in practice.
5. Concluding remarks

This study – undertaken in Ghana, Kenya and South Africa – aimed to provide insights into the needs of early career researchers in Africa with regard to digitalisation of research. Our focus was on digital access, perceptions of digitalisation and levels of engagement in order to determine the extent to which ECRs are prepared to take advantage of the myriad opportunities proffered by technological innovations developed in the context of digitalisation to undertake and disseminate their research in an era of novel developments in digital scholarly communications.

ICTs and digitalisation have a great potential to enhance the development of a critical mass of ECRs at African universities and need to be comprehensively integrated in university policies, plans and strategies. In addition to enhancing ECRs research potential, digitalisation can assist in building academic and research communities and networks in Africa and linking them to researchers and institutions in other parts of the world, thus fostering internationalisation and international collaboration.

ECRs in Africa face varied challenges in utilising ICT and digital technologies for research. The study revealed several barriers to effective utilisation of digitalisation for research, especially as a result of the digital divide and socio-economic challenges. Concerted efforts need to be made to address these challenges at the institutional and national levels.

The findings highlight the importance of investment in digital infrastructure to support young and established researchers and academics, as well as the need for comprehensive training and development opportunities for researchers, as digitalisation and digital transformation are dynamic and ever-changing processes. Institutions need to invest in ICT and digital platforms to enhance the quality of teaching and learning and to support ECRs in their research. As highlighted by The African Open Science Platform (2018: 6), countries that do not develop digital capacities, infrastructure and skills at their own institutions of higher learning and research will depend on the capacity and skills from other countries and institutions, thus lacking capacity to take advantage of digital transformation for socio-economic development and progress.

Further research on digitalisation in higher education, with specific focus on research, is needed in a number of areas, including:

- Development of hybrid models for in-person and digital research activities
- Academic, pedagogical and research use of digital technologies for research
- Research approaches for the digital space
- Digital research design and methods
  - Access to data/participants
  - Data collection protocols
  - Ethics and privacy

Figure 11 (page 33) is a visual depiction of the findings in this report. It provides a snapshot of the most pertinent phrases the ECRs associate with being a digital scholar. Furthermore, the skills and tools identified by ECRs has been summarised.

Limitations of the study

- **The short time frame** for the completion of the study limited how much time could be spent on completing each phase of the research and thus could have resulted in different outcomes with a longer timeframe.

- **The study focused on only three African countries.** This was done due to the lack of sufficient time and capacity to expand the study to other countries. However, the findings from Ghana, Kenya and South Africa give an important snapshot of the issues, challenges, needs and possibilities related to digitalisation of research for ECRs. Future studies should focus on these and other countries, as ECRs’ experiences in different countries may contribute new perspectives and lead to different results.

- **Small number of survey responses in South Africa:** Our survey received 108 responses from Ghana, 51 responses from Kenya and 37 responses from South Africa. While the research team worked hard on increasing the number of responses, digital fatigue, which was mentioned by some participants in the focus groups, may be the reason why more early career researchers did not complete the survey in South Africa and Kenya. The researchers acknowledge that given South Africa’s position as a PhD hub on the continent, this low response rate can be misleading in terms of ECRs’ experience and engagement with digitalisation.
• **Focus on ECRs only:** The sample for this study were early career researchers. While their experiences and voices are very valuable and provide insights into ECRs experiences with digitalisation of research in Africa, the voices of supervisors, established researchers who work with ECRs and institutional representatives responsible for digitalisation and ICT would provide additional insight into the needs, challenges and possibilities. This should be explored further in future research.

• **Focus on ECRs at universities:** This study focused primarily on ECRs who are at universities in Ghana, Kenya and South Africa. While this is important and relevant, it leaves out many ECRs who work in the public and private sector and research institutions outside the higher education sector. Future studies should focus on these ECRs as they might have different experiences and views on digitalisation of research.
Defining the digital scholar

- “Is able to use most digital technologies designed to support research”
- “Uses digital platforms for collaboration with other scholars and researchers”
- “Is visible on most academic social network sites and platforms”

Skills
- Collaboration
- Digital literacy
- Ethics & integrity
- Communication
- Effective use of digital & online tools

Engage & collaborate with peers on the continent and around the world
Understanding cyber security, privacy & ethics

Creating an enabling environment
Investment in digital infrastructure comprehensive digital skills development

Tools
- Electronic Resources e.g. Google Scholar & Mendeley
- Academic social networking e.g. Academia.edu
- Instant messaging platforms e.g. WhatsApp
- Social media and social networking platforms e.g. Facebook & LinkedIn

Figure 11: Visualisation of results
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