

**BOOSTING
DECENT
EMPLOYMENT
FOR AFRICA'S
YOUTH**

EVIDENCE SYNTHESIS PAPER

14/2023

DIGITAL SKILLS FOR YOUTH EMPLOYMENT IN AFRICA

**Fostering Digital Transformation for Social
Inclusion, Gender Equality & Development**

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ThinkYoung

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**DECENT JOBS
FOR YOUTH**



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Acknowledgements

The author extends a special thanks to Ilaria Nilges for invaluable research assistance, content review, and advice throughout the drafting of the paper. The author also gratefully acknowledges the support of Delila Kidanu, alongside the guidance, feedback, and editorial work of Siri Lijfering, Agnieszka Kazimierczuk, and the entire INCLUDE team and partners involved.

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First published by the INCLUDE Knowledge Platform on Inclusive Development Policies in January 2023



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This publication has been made possible with the financial support from the Dutch Ministry of Foreign Affairs.

Executive Summary

Digitalisation and technological advancements are changing the world of work and the types of skills needed for employment. Across Africa, digital skills are becoming increasingly important, with an estimated 230 million jobs in Sub-Saharan Africa (SSA) alone needing digital skills by the end of the decade. However, skills deficiencies and a lack of basic digital skills needed to use technology to solve real-life problems, key for life-long learning in the digital world and higher-level digital skills development in the future, are failing to be equitably accessed. This is particularly rife among the less well educated, marginalised groups, people in rural areas, and those who are vulnerably employed. Women and girls face additional barriers to digital skills, with root causes stemming from the triple burden of the digital, rural, and gender divide. The COVID-19 pandemic has exacerbated these burdens by deepening pre-existing interlinked inequalities and amplifying social exclusion.

The unequal access to digital skills development is hindering the transformative potential of digitalisation for social inclusion, gender equality, and development. Resultantly, key barriers and bottlenecks to digital transformation must be overcome, including a lack of digital infrastructure, the digital divide (both in terms of access to digital technology, and acquiring digital skills and capacities), skills mismatches between education and the labour market, and conducive policy and regulatory environments needed for long-term change. Interventions across the entire digital ecosystem to boost youth employment are needed to prepare Africa's youth for the current and future world of work. This is key if Africa's 'youth bulge' and demographic dividend is to be transformed into an economic one, and to counter employment trends across the continent characterised by informal work, under-employment, and precarious working conditions (Fox & Gandhi, 2021).

Digital transformation has the potential to reverse the trend of 'jobless growth', altering the structure of African economies by investing in digitally-enabled decent jobs. Through the equitable provision of basic, foundational digital skills - digitalisation can see employment and productivity gains in traditionally low productive and informal sectors which are overrepresented by marginalised groups, youth, and women and girls. Digital policies and interventions with a specific focus on gender mainstreaming are fundamental in this regard and are a key step in reversing the negative impact of the pandemic on women and girls, and to see improved digital inclusion and gender equality outcomes crucial for social inclusion.

Objective

This paper critically engages with the key interrelated drivers and barriers to digital skills development and gainful employment for young people in Africa. It does this through the lens of digitalisation and digital transformation, and investigates how the right enabling environment can be fostered across the continent.

The paper explores the key terminologies and discourses linked to digital skills education and uptake, with a focus on digital skills and digital literacy, the digital divide, and digital inclusion as a driver of social inclusion. A focus is also placed on youth employment within different sectors of the labour market, sector transformation, and the areas where digital skills can have the most significant impact on young people's socio-economic situation. Moreover, current and future challenges associated with the skills and capacities required for the Fourth Industrial Revolution (4IR) are identified based on selected case studies of policies and interventions in Ghana, Kenya, and South Africa to help contextualise the broader theoretical discussions, and to draw best practices from the public, private and third sectors.

Recommendations

Based on the evidence summarised throughout this paper on the role of education and digital skills for youth employment, and how this links to interventions from both policy and practice, the following key actions and interventions across the entire digital ecosystem are recommended:

Improve the Quality & Relevance of General Education

- Focus on the equitable uptake of foundational digital skills at primary and secondary level education. This is key in laying the groundwork for life-long learning by ensuring young people master the relevant soft and hard skills to be developed at later stages in life.
- Ensure the relevant infrastructure, devices, and connectivity are accessible in schools with a specific focus on rural areas and marginalised groups, as noted in the South Africa case study. This needs to be coupled with the adoption of ICT and digital tools for education among teachers through Teacher Professional Development (TPD) strategies.

Leverage the Potential of Technical and Vocational Education & Training (TVET)

- Focus on foundational digital skills learning and uptake among TVET students and their importance in labour market access, adaptability, and mobility.
- Adopt a two-pronged approach by prioritising both advanced digital skills in catalytic sectors, while also supporting the relevance and impact of TVET for low-skilled occupations and in informal sectors (e.g., agriculture & informal services).
- Improve links between TVET and industry, ensuring the right skills for the labour market are being provided with direct input from employers. This should be prioritised to ensure interventions are demand-driven and the desired impact is achieved before scaling up.
- Build on the steps made to harmonise TVET curricula and qualifications to foster improved transferability and recognition of the skills required for gainful employment.

Foster Policy Coherence to Realise the African Union Agenda 2063

- Ensure interventions across the entire digital ecosystem to see mutually enforcing actions and to tackle the digital divide. Digital policies need to be streamlined to see positive outcomes across education and training, digital infrastructure, and employment.
- Bolster national digital policies and implementation efforts through fiscal interventions. Mobilise public financing for digital skills development while linking digital skills education to labour market needs as showcased in the Kenya case study.

Mainstream Gender Equality in Digital Transformation Policies

- Include a focus on gender mainstreaming in digital strategies with specific policies for each sector (e.g., digital infrastructure, digital skills and literacy) to tackle the digital gender divide and foster gender equality.
- Leverage and develop digital skills and literacy training beyond school curricula to expand the opportunities for women and girls to develop digital skills. Secure public financing for civil society and third sector interventions targeting marginalised women and girls as seen in the Kenya case study.

Target Digital Skills Development in Low Productive Sectors and Informal Work

- Maximise the potential for economic and social inclusion through the promotion of digitally enabled jobs in the informal sector. Target basic foundational digital skills learning for people in rural areas, and in the agricultural sector to make the most of digital solutions as seen in the Ghana case study.
- Boost productivity in traditionally low productive sectors to increase attractiveness among youth, young women, and marginalised groups, and to provide more and better jobs to foster gender equality, development, and inclusion.

Secure Public-Private Partnerships (PPP) for Programme Sustainability

- Build on the positive impact of public-private partnerships across the entire digital ecosystem (education, digital skills, infrastructure) to foster digital transformation, and ensure long-term structural change through equitable digital skills uptake, increased connectivity, and gender equality.

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Introduction

Africa has seen strong economic growth for most of the 21st century, with a rise in Gross Domestic Product (GDP) of 4.9% on average per year between 2000 and 2019 in Sub-Saharan Africa (SSA) (IMF, 2019).^[1] This included one quarter of the region recording a GDP growth of 7% or more (EARF, 2018; Filmer & Fox, 2014). However, these statistics do not accurately reflect the situation across the continent, where economic growth fails to generate social and economic inclusion through the creation of sufficient jobs (ILO, 2020; Sy, 2014). This has resulted in a largely 'jobless growth' (Sy, 2014). In rural areas, many people live at the basic level of subsistence because of lower education levels and a lack of access to stable work and remuneration (Filmer & Fox, 2014; GIZ, 2018). As a result, while economies across the region are growing rapidly, employment is still characterised by informal work, under-employment, precarious working conditions and low-productivity (Duarte, 2021; Fox & Gandhi, 2021).

The COVID-19 pandemic has exacerbated these issues due to its negative effect on the economy, especially for youth who are overrepresented in sectors that are most at risk of disruption (ITU, 2022). Since its onset, SSA saw economic activity shrink by 5% per capita, resulting in the first recession across the region in over 25 years and the worst seen in half a century (AfDB, 2021; Waswa et al. 2021). Across the whole of Africa economies contracted by 2.1%, with annual GDP growth seeing a significant decline from the impressive pre-pandemic figures (Tsikata & Torvikey, 2021). Despite this contraction improving, GDP is still predicted to remain below 4% in 2023. The long-term impact of the pandemic will likely see productivity across the whole of Africa remain below pre-pandemic trajectories until 2030 (Djiofack et al, 2020; OECD, 2021; World Bank, 2021b). As a result, the pandemic has bolstered the urgency for African economies to build stronger and more resilient digital transformation policies critical in maintaining progress towards realising African Union's Agenda 2063, and reversing these negative economic effects (OECD, 2021). These policies need to accelerate structural transformation^[2] through productivity enhancing growth and by creating inclusive economic development and more and better jobs (Zeufack et al, 2022). This is key for young people who have seen significant falls in labour force participation as a direct result of the pandemic (ILO, 2021).

The Youth Bulge in Africa

Africa has the youngest population in the world, with SSA set to be the region with the largest youth cohort, home to 17% of the world's working age population, and a median age of just 24 by 2050 (Betcherman & Khan, 2018). This key demographic transformation, often referred to as Africa's 'youth bulge', takes place when there is a significant increase in the number and proportion of young people in the population, and when large birth cohorts move towards working age (East Africa Research Fund, 2018).

[1] The introduction sets the scene, with Africa and SSA referred to interchangeably. In the rest of the paper, unless otherwise stated in text or in footnotes, the focus is on SSA based on its low internet penetration, digital infrastructure, and digital skills and literacy rates. Sub-regions of SSA are referred to when relevant for the purposes of this paper.

[2] Structural transformation is defined as the transition from low productivity and labour-intensive economic activities to higher productivity and skill intensive activities (Oyebanji & Kaushalesh, 2016). A key driver of this is a change of productivity across three broad sectors of an economy: agriculture, industry, and services (Beylis et al, 2020).

These demographic trends have been a cause of both concern and excitement. On the one hand, there is the threat of large-scale unemployment on the continent. On the other hand, however, if leveraged in the right way there is great potential to see significant economic growth and increased productivity through youth employment (Fox & Gandhi, 2021).

According to the African Development Bank (AfDB), in 2015, one-third of Africa's then 420 million young people between 15 and 35 were unemployed, another third was vulnerably employed and only 1 in 6 was formally employed (AfDB, 2016). The number of young people between the age of 15 and 24 not in employment, education or training (NEET) has been steadily growing since 2012, with 1 in 5 young people being NEET in 2020 (ILO, 2020). As the ILO notes, an overwhelming majority (95%) of employed youth aged 15-24 are in the informal economy, and this includes two-thirds with secondary education and almost one-third with a university degree (ILO, 2018). Africa's 'youth employment' crisis is, however, more than a purely youth-based issue - it represents a crisis of missing jobs due to the structure of African economies dominated by informal employment opportunities and the need for economic transformation (Fox et al, 2020).[3] This reiterates that while Africa has an unemployment problem, it also has a significant problem of underemployment - with high levels of low-quality, non-wage, and casual employment (AfDB, 2019). As a result, it is urgent to tackle the causes of both unemployment and underemployment in Africa and create better opportunities for youth. The provision and availability of decent jobs[4] is key, with empirical studies noting that job decency for African youth has positive individual and societal benefits. These include socio-economic stability and positive mental health outcomes linked to gainful employment (Musariri & Moyer, 2021).

Digital Transformation as an Enabler

Africa has the youngest population in the world, with SSA set to be the region with the largest youth Digitalisation and technological change have the potential to provide opportunities for youth employment through digital transformation.[5] More specifically, new technologies in the wake of the Fourth Industrial Revolution (4IR) - which is the fusion of the digital, biological and physical worlds using technologies including robotics, cloud computing and wireless technologies, amongst others - have transformative potential for youth through economic growth and development (Ndung'u & Signé, 2020; Signé, 2022). This includes the potential to reduce production costs for businesses, improve productivity and earnings, the development of new business lines, and the provision of a wealth of new and accessible opportunities for young people (Fox & Signé, 2021). Digital transformation through digitalisation, including the deployment of 4IR technology, has the potential to create new formal wage jobs faster than the labour force is growing, alongside improving earnings in the informal sector (Fox & Signé, 2022). However, for this potential to be realised many of the longstanding obstacles to innovation need to be overcome, including logistics, infrastructure bottlenecks, and inclusive education with a focus on the digital skills and capacities needed for the future of work (Fox & Signé, 2022).

[3] The same missing jobs narrative applies to all working age groups.

[4] According to the ILO decent work sums up the aspirations of people in their working lives. Job decency includes opportunities that are productive, deliver a fair income with workplace security, and prospects for personal development and social integration.

[5] As the OECD notes, digitalisation is the use of digital technologies and interconnection that leads to new or changes to existing activities. Digital transformation refers to the economic and societal effects of digitalisation.

As a result, the right enabling environments need to be fostered across Africa. Despite investment efforts, African countries have not been able to reap the expected benefits generally associated with digitalisation (van Klynton & Solomon, 2020). This is largely due to the persistent and widespread digital divide and gaps in Information and Communications Technology (ICT) infrastructure (Melia, 2020; van Klynton & Solomon, 2020). To capitalise on the benefits of 4IR technologies, countries need a comprehensive strategy to respond to the challenges faced by digitalisation. This includes relevant regulatory environments, reducing gaps in physical and digital infrastructure, and interventions that foster the equitable uptake of digital skills aligned with the skills-intensive nature of 4IR technology and the changing demands of the future of work (Fox & Signé, 2022; UNFPA, 2022). These interventions must be inclusive and reach marginalised groups, with poorer youth and those in rural areas most at risk of being left behind due to limited access to education and training, and electricity and ICT services (Fox & Signé, 2021). This makes digital transformation strategies at the continental and national level, and how they link to youth employment an even more salient issue looking to the future.

With the above in mind, this paper further explores what is needed for Africa to capitalise on the opportunities presented by digital transformation while also tackling its associated challenges. This is paramount if Africa is to turn its demographic dividend into an economic one (AfDB, 2016; UNFPA, 2021). It does this by synthesising existing research on the role of education and digital skills for youth employment, and how this links to interventions and insights from policy and practice.

Structure & Roadmap

The paper is organised as follows. Section two outlines the key terminology used in the paper, elaborating on digital skills and literacies, and provides a contextualised summary of key interrelated themes including the digital divide and digital inclusion as core components of social inclusion. Section three discusses national and regional policies in Africa with a focus on digital transformation strategies, and the international policy context. This is followed by an analysis of the drivers and barriers to digital transformation in section four (including the skills mismatch, the role of education and Technical Vocational Education and Training (TVET) institutions, gender mainstreaming, and sectoral innovation). Section five presents three country case studies (Ghana, Kenya, and South Africa) [6] and extrapolates best practices for digital skills development linked to the national and regional contexts. The final section brings together the uncovered insights and highlights the need for cross-sector interventions spanning the entire digital ecosystem. Furthermore, it provides recommendations for the public, private and third sectors based on best practices in digital skills development linked to the future of work.

[6] The country case studies were chosen based on geographical location, internet penetration, and comparability. While the insights uncovered are meant to be applicable across the continent regardless of economic development, it is important to note that regions and countries are not homogenous, and some interventions and actions will be more suited to some regions and countries than others. The three case study countries are also more economically developed than many other countries across the continent.

Definitions, Concept & Scope

It is estimated 230 million jobs will require digital skills by 2030 in SSA, and a further 57 million just in five countries across the region (IFC, 2021).[7] It is therefore crucial to understand what digital skills entail and how they link to the current and future world of work. Within discourses on digitalisation and youth employment, the interplay between digital skills, digital literacy, the digital divide, and how young people can be equipped with the right skills and competencies to positively contribute to the future of work and adapt to digital transformation is widely discussed. However, a lack of consensus on a unified and common definition of digital skills and digital literacy means there is a breadth and plurality of terms used, with concepts often overlapping (Audrin & Audrin, 2021; Spante et al, 2018). Similarly, over the years many frameworks and definitions of digital skills have been introduced (e.g., 21st century skills, digital skills, digital literacy, e-skills, and internet skills) (van Laar et al, 2020). Based on this, the following section explores the terminology and discourses of these concepts and then subsequently narrows them down in line with digital skills in the context of youth employment in Africa.

Digital Skills

The term 'digital skills' is widely used in academic literature, with many definitions present. An early definition widely referenced and built on in subsequent frameworks by Van Dijk (2006) defines digital skills as a set of skills that users need to operate computers and their networks, search and select information, and use them for their own goals. This breaks digital skills into three main components: technical skills, information seeking skills, and strategic skills. From a contemporary academic perspective, text mining of over 1037 articles found that information literacy, ICT, communication, collaboration, digital content creation, research, and decision-making skills are the most representative of the words linked to digital skills (Tinmaz et al, 2022). This reiterates the plurality of terms associated with the topic. Van Laar et al (2017) further breaks down digital skills into the following categories: technical, information management, communication, collaboration, creativity, critical thinking and problem-solving.

Digital Skills linked to the 4IR & the Future of Work

Varying digital skills and competencies are needed in response to disruptive technology linked to 4IR technologies like the Internet of Things (IoT), cloud technology, big data, and robotics (Sousa & Rocha, 2019). Through a scoping review of peer-reviewed articles identifying the required skills, this included 'soft skills' such as communication, creativity, and problem-solving (Benešová & Tupa, 2017; Chaka, 2019). Various 'hard skills' were also presented, with competencies linked to specific aspects of the 4IR and its related technology including data analytics, big data analysis, programming, coding, and data visualisation (Ahmed et al, 2018; Contreras & Micheal, 2015; Motyl et al, 2017). This emphasises the changing nature of skills demands based on technological development, and that as disruptive technology becomes more widespread, the skills needed to be able to learn and implement these new technologies changes (Bikse et al, 2022).

[7] These five countries are Nigeria, Kenya, Côte D'Ivoire, Mozambique, and Rwanda. According to the International Finance Corporation (IFC) the 57 million jobs requiring digital skills in these countries will need roughly 114 million training opportunities.

Breaking down the wide array of digital skills into actionable frameworks is still work in progress and constantly evolving, as noted above. However, to streamline the process within the African context, which is key for digital skills development and youth employment, digital skills can be broken down into four proficiency levels (World Bank, 2020).

Box 1: Digital Skills Framework[8]

HIGHLY SPECIALISED

Digital skills for current and future 4IR technologies including big data analytics, computer programming, specialised automated equipment, machine learning and Artificial Intelligence (AI).

SPECIALISED/ADVANCED

Specialised digital skills including the mastery of software for coding, interaction with robotics, and advanced design software, amongst others.

INTERMEDIATE

Developed digital skills required to use different ICT software and systems. These range from the use of simple spreadsheets to professional software for business, marketing, or any other professional output.

BASIC/FOUNDATIONAL

Baseline digital skills required for life-long learning and continued progression in the digital world. These skills cover simple tasks like turning on and using a computer, to browsing the internet for web research, and online and mobile communication and file sharing.

Digital literacy

Digital literacy as a concept has been approached from several angles and perspectives, resulting in various definitions which are often overlapping, competing or divergent (Buckingham, 2016; Helsper & Eynon, 2013). However, they often stem from the ability to understand and use information in multiple formats from a wide range of sources and being able to 'contextualise the internet' as noted by Gilster (1997). The varying definitions also largely agree that multiple literacies are required for people to create knowledge and participate in society: including the mastery of ICT skills, critical skills to engage in social practices across boundaries of culture, countries and territories, and life-long learning (Buckingham, 2016; Njenja, 2018). Digital literacy does not just focus on technical skills and their wider application but encompasses a cognitive dimension (Spante et al, 2018; van Laar et al, 2017).

The various methodologies used to try and classify digital literacy, based on being overlapping or non-exhaustive, reiterate the complexities in separating digital skills from digital literacy (and their associated terminologies) (Tinmaz et al, 2022; van Deursen et al, 2015).

[8] This is a non-exhaustive list combining digital skills breakdowns and frameworks from the World Bank (2020), the IFC (2021), and UNCTAD (2017). Later in the paper these are linked to sector modernisation in Africa, and the types of skills needed to foster decent work.

Therefore, further research should be conducted to place digital literacy within its many technologies[9] and across the different aspects of life it encompasses (e.g., education, employment, governance, health) (Tinmaz et al, 2022). However, a clear distinction seems to be that while both digital skills and digital literacy have interrelated sets of technical and cognitive skills, literacy focusses more on the cognitive side, moving away from technical proficiency to the human proficiency and mindset needed to live, learn, and work in the digital world (Bali, 2016; Tinmaz et al, 2022). As a result, digital literacy empowers people in exchange, collaboration, and participation through ICT (Martinez et al, 2021).

Following on from the definitions above, it is also noted that digital literacy cannot be completely removed from the context in which it is applied (Garrido et al, 2012; Michailova, 2011). Failing to do so can reduce the term to a mere set of competences and skills to perform given tasks using digital technology, ignoring aspects of learning, problem-solving, critical thinking, creativity, and self-regulation - influenced by the social, economic, and cultural context in question (Njenga, 2018). This has led to the conclusion that while digital literacy education can bring about similar challenges in different contexts, there is a need for local conceptualisations of digital literacies in increasingly globalised education systems (Pangrazio et al, 2020). This is based on digital literacy encompassing the setting, practices, and purposes in which technology is used (Casey & Bruce, 2011; Njenga, 2018). [10] A further key element of digital literacy is the need for inclusivity, a concept that is inextricably linked to the digital divide and digital inequality (Reynolds, 2016).

The Digital Divide

The digital divide has been identified in the literature on two levels, with the first referring to the inequalities created by a lack of access to digital technology, and the second focussing on the variation in the sophistication of use and user expertise (Livingstone & Helsper, 2007). According to the International Telecommunication Union (ITU) (2021), 28.6% of individuals in Africa have access to the internet, while the global rate is 51.4%. This lack of infrastructure is accompanied by financial inequality and unaffordable devices (such as smartphones), low-quality internet access, and limited digital skills and digital literacy, both in general and more specifically in rural areas (ITU, 2021). In other words, the digital divide is more than just access to the internet and technology, but encompasses the skills and literacies present and how they benefit the user (Duarte, 2021). A key aspect of this is unequal user outcomes - a theme discussed throughout the paper but of particular importance in the developmental context. As a result, gaps in digital skills between groups of people leads to a different use of digital technology. Moreover, people from less financially stable or marginalised backgrounds often struggle for daily subsistence - with digital technology of little help, and its provision without structural guidance failing to solve immediate life concerns (Duarte, 2021; James, 2019). Therefore, the context in which the rural poor are living is key in devising strategies to close the second level of the digital divide. As James (2019) notes through an analysis of SSA, this is because the necessary skills to make the most of digital technology are far scarcer in rural areas, with the digital divide being much more acute (ITU 2018; James, 2019).

[9] For example, the digital literacy skills required for artificial intelligence and 4IR technologies.

[10] This paper adopts a similar concept of digital literacy - and links the need for local contextualisation to the findings uncovered in the country case studies. These are then extrapolated across Africa where relevant.

The Digital Gender Divide

The use of and access to digital technology is not gender-neutral, with the 'digital gender divide' having root causes including barriers to access, affordability, education (or lack thereof), gaps in digital skills and literacy, and inherent biases and socio-cultural norms (OECD, 2018). These socio-cultural norms range from the belief that technology is for men and boys, with parents being stricter with girls for mobile use or access to the internet, to increased barriers faced by women and girls due to affordability and economic exclusion (Mariotti, 2021).

Moreover, girls and adolescents across SSA face disadvantages in acquiring digital skills both at home and in school, with data from the UNICEF-supported Multiple Indicator Cluster Survey (MICS) noting that in all the countries involved adolescent boys (15-18) had higher digital skill levels when compared to their female counterparts (Amaro et al, 2020). Along similar lines, a lack of knowledge about the internet accompanied by a lack of time to learn digital skills are key barriers hindering the ability of women to benefit from digitalisation. It is essential to tackle this barrier as becoming technologically and digitally skilled provides direct and indirect benefits to women's personal and professional empowerment as seen in the Vusha Project in the Kenya case study. This in turn reiterates the fundamental need to improve and expand women and girl's digital skills and literacy education and training as it is the cornerstone to reducing the digital gender divide (Ruhani & Lock, 2019).

As dependence on digital devices and reliable internet grows, it is becoming increasingly clear that being digitally excluded means also being socially excluded (Reisdorf & Rhinesmith, 2020). This is because digital exclusion blocks access to the opportunities afforded by digital technology and internet accessibility. This exacerbates social exclusion, with marginalised groups at risk of being further 'left behind' in terms of employment opportunities, income generation, and wider societal engagement including political participation and public/state support, amongst others (Ragnedda et al, 2022). However, digital inclusion does not directly lead to social inclusion, with socio-demographic background, the kinds of devices used (including dependence on mobile data plans), and attitudes towards technology all impacting which strategies to boost digital and social inclusion will work best (Dutton & Reisdorf, 2019; Reisdorf et al, 2020). This again emphasises the need to address both levels of the digital divide to foster equality, youth employment, and increased productivity.

In line with the terminology and conceptual framework outlined above (and summarized in Box 2), the rest of the paper will address how digital skills and literacies are distributed across Africa, and between youth groups based on socio-demographic factors.

Box 2: Glossary of Terms

DIGITAL SKILLS

Specific skills that allow individuals to use digital technology for solving real-life problems. Digital skills encompass 'soft' skills including communication, collaboration, decision-making, creativity and content creation, and 'hard skills' including software use, coding, programming, and big data analysis, among others. Digital skills can be broken down into four main proficiency levels ranging from the basic and foundational level needed for life-long learning and continued digital skill progression, to intermediate, specialised, and highly specialised.

DIGITAL LITERACY

An overall capacity, including an awareness and understanding of the role the digital environment plays, as well as the knowledge and mindset to live, learn, and work in the digital world. Digital literacy empowers people in collaboration and participation through digital technology for individual development.

THE DIGITAL DIVIDE

Inequality between individuals in relation to digital technology. The first level refers to gaps in access to devices, the internet, and digital technology. The second level is the inequality in the use of digital technology due to a lack of skills and knowledge (digital skills and digital literacy).

Policy Context & Analysis

Digitalisation as a pathway for development and job creation has become an increasingly central part of national policies and plans across Africa - aiming to respond to the challenges of the future through digital transformation (Abimbola et al, 2021). However, the policy landscape across the international, regional, and national contexts is complex, with multiple actors and interventions in place. As a result, the interpretations and implementation of varying digital policies differ considerably. This section maps out and presents some of the key policies and frameworks linked to digital transformation, with a particular focus on digital skills education, digitalisation, and gender.

Continental Policies & Agenda 2063

The African Union Agenda 2063 has become a focal point for driving the continent towards the realisation of the Sustainable Development Goals (SDGs) (AUC, 2015). Adopted just before the SDGs in 2013 but with somewhat interlinked aims and objectives, the Agenda is made up of 20 goals clustered into 7 aspirations (Royo et al, 2022). Much like the SDGs, mutually enforcing actions and 'policy coherence' are needed to achieve the objectives of Agenda 2063. For example, by fostering engaged and empowered youth and children (goal 18) added benefits could be created to stimulate full gender equality in all spheres of life (goal 17), and vice versa (Nilsson et al, 2016).[11]

In the context of this paper, aspiration 1 of Agenda 2063 is of particular importance because of its aim to create 'a prosperous Africa based on inclusive growth and sustainable development'- requiring Africa to make significant investments in education to develop human and social capital through an education and skills revolution (AU, 2022). Agenda 2063 aims to do this by actively promoting science, technology, research and innovation - and building knowledge, human capital, and innovation skills (AUC, 2015). This priority includes universal access to quality childhood, primary, secondary, and university education, gender parity, and the strengthening of Technical Vocational Education and Training (TVET) through investments, links with industry and the labour market, and improved digital skills and employability outcomes (AUC, 2015). An example is the plan to establish a Pan African Virtual and E-University (PAVEU) to teach digital skills and foster digital transformation as a flagship project of Agenda 2063. Launched in 2019, the initial phases saw challenges including inadequate staffing and equipment to support the delivery of online classes, and financial resources (AUDA-NEPAD, 2020).[12]

In 2015, the Continental Education Strategy for Africa (CESA) was launched to address four main education priorities in Africa as classified by the African Union Commission (AUC): 1) equity, 2) learning, 3) relevance and 4) affordability (AU, 2020). Designed to help achieve Agenda 2063, the CESA outlines 12 strategic objectives, ranging from education infrastructure improvements, stronger curricula, the expansion of TVET at secondary and tertiary levels, better links between education and the labour market, and the setting up of a coalition of education stakeholders (AU, 2020).

[11] These would also see knock-on effects to the goals of the SDGS, including education efforts for girls (goal 4), gender equality (goal 5) and economic growth (goal 8).

[12] Enrolment is running for the 2022/2023 academic year.

Linked with the above, the TVET Continental Strategy was introduced to provide a framework for the design and development of national strategies and to address the challenges of education and TVET including cost, relevance and attractiveness (AUDA -NEPAD, 2022).[13]

In line with digital transformation and policy coherence, the Digital Transformation Strategy for Africa 2020-2030 was introduced with the central objective of using digital technology and innovation to generate inclusive growth and jobs through digital enabling environments (AU, 2020). In a broad sense this covers foundational pillars including the harmonisation of policies and regulations across the continent (especially cross-border infrastructure) to foster innovation, digital skills and entrepreneurship, amongst others (Abimbola et al, 2021).

National Implementation

While the above strategies are ambitious in their aims and objectives, the key challenge is connecting continental and regional policy frameworks to national implementation efforts (Abimbola et al, 2021). In view of the varying continental strategies outlined above, it is up to national governments to update and implement their national digital strategies to ensure digital transformation (Devermont & Harris, 2021). However, the capacity to renew and implement policies and national frameworks varies across SSA. Kenya is regarded as a best practice example as it has some of the most advanced digital legal frameworks with gender mainstreaming principles, including in the National ICT Policy (2019), the Digital Economy Blueprint (2019) and Kenya Vision 2030 (Abimbola et al, 2021; Devermont & Harris, 2021). The Ministry of ICT, Innovations and Youth Affairs introduced the Ajira Digital Programme to help realise Vision 2030.[14] Centres have been opened across the country offering young people digital training opportunities and access to digital jobs (Ajira, 2022; Midani, 2021). Moreover, 90% of public schools were provided with digital devices, and the Ministry of ICT through its Schoolnet Programme alongside the United Nations Children's Fund (UNICEF) has identified over 1,000 public and private schools to be given internet services to boost digital skills and literacies as part of phase one (Wanja, 2021).

Along similar lines, an investigation into enabling women's empowerment noted that among the countries included in the review - Rwanda, Kenya, Nigeria and Zambia had more comprehensive digital strategies with different policies for each sector (e.g., infrastructure, literacy) with gender mainstreaming included (Devermont & Harris, 2021). It was also noted that Rwanda is a good example of implementation by providing financial backing to policies - having dedicated 500 million dollars to create economic transformation (including accountable governance) with a pillar on women and youth empowerment through technology as part of the National ICT Strategy and Plan (NICI) (NICI, 2015; Ruhani & Lock, 2019). In comparing national implementation, it was also noted that countries with underdeveloped or missing digital policies (e.g., Sudan, Mozambique and DR Congo) were less economically developed or had recent political instability (Ndulu et al, 2021; Ruhani & Lock, 2019). This likely resulted in an unbalanced investment in short-term revenue projects, or a lack of adequate financing resources in general - discouraging the pace of digitalisation and highlighting the need for fiscal interventions (Ndulu et al, 2021).

[13] TVET is discussed in more detail in chapter 4.

[14] The Ajira Programme is discussed in more detail in the Kenya case study.

The Role of the EU in Digital Transformation across Africa

While Africa's digital landscape has numerous stakeholders both internally and externally, the EU is a key player in Africa's digital infrastructure and transformation (Abimbola et al, 2021; Arcesati, 2021). [15] This is because it is the largest overall donor, with OECD data showing that the EU and its Member States contribute approximately €20 billion per year in Official Development Assistance (ODA) (Tshuma, 2022).[16] Moreover, new agreements which were postponed because of the COVID-19 pandemic have been reached, including the EU Strategy for Africa and the post-Cotonou agreement - underpinning relations with Africa while supporting the development of digital skills and literacy and the use of digital technologies (European Parliament, 2021). Financed through the EU's long-term budget - the multi-financial-framework (MFF) - specific interventions in SSA will include the funding of 5 TVET colleges with mandatory digital skills training in South Africa, supporting workplace based digital skills development in Kenya, and the provision of skills in the digital and green sectors in Ghana (European Commission, 2022).

Resultantly, EU aid and investments are critical in addressing urgent needs in digital transformation, education, and infrastructure, which is even more crucial given the negative impact of COVID-19 on the economy and on livelihoods (Nanfuka, 2022; Tshuma, 2022). In the past two decades the EU has funded projects with digital components without playing a pro-active role in digital transformation (Ruhani & Lock, 2019). However, through the Digital4Development (D4D) framework adopted in 2017, the EU has mainstreamed digital transformation within its development programmes. Priority areas include fostering improved infrastructure and connectivity, and digital literacy and digital skills, with the latter focussing on education and training systems and the introduction of digital skills including coding and digital entrepreneurship from primary up to tertiary education (European Commission, 2017). Africa is the first and main focal point for D4D policy, with the principle of 'no one left behind' and social inclusion as the driving forces behind digital transformation interventions. Moreover, through the recent communication 'Towards a Comprehensive Strategy with Africa' - digital transformation is a future focal point. This will include investments in increasing digital infrastructure, access to safe and affordable digital services, and growth and jobs through skills development for youth and women (European Commission, 2020).

The above discussion on international, continental, and national policy frameworks to foster digital transformation highlights the interconnected nature of interventions. Moreover, it reiterates the need for policy coherence across the digital agenda landscape, with the need for domestic, continental and international partnerships, and harmonised standards to see transformative change (Abimbola et al, 2021).

[15] For instance, China has emerged as a major provider of digital infrastructure across Africa with the 2015 Digital Silk Road as a recent example (Arcesati, 2021).

[16] In 2015, the EU-28 (including the UK) contributed 50.1% of the total share of ODA to Africa, and in 2018 the figure was €25 billion.

1.

Drivers and Barriers to Digital Transformation

For digitalisation to achieve its transformative potential key barriers and bottlenecks need to be overcome (Fox & Signé, 2022). This section discusses and analyses the interrelated factors preventing and driving digital transformation. It does this by focussing on the skills mismatch with the labour market, digital skills education and TVET, digital infrastructure, the role of public, private and third sector[17] interventions and financing, and the impact of the COVID-19 pandemic.

1.1 Youth Capacities and Private Sector Requirements: A Mismatch of Skills

While the mismatch of skills refers to the situation where imbalances exist between the skills offered through education and training and the skills required within labour markets, mismatches can range from vertical and horizontal, to skill gaps, skills shortages, and skills obsolescence. Vertical mismatch refers to individuals who work in jobs where their level of education and skills is less or more than required, while horizontal mismatch is the inappropriate matching between an individual's field of education and the role in question (ILO, 2017; McGuinness et al; 2017). Moreover, skills shortages exist when demand for certain skills exceed supply, gaps emerge when the type of skills present are inadequate to perform a job, and obsolescence refers to skills that are either deteriorating or outdated (ILO, 2017).

Most analysts predict SSA will need a more skilled labour force to absorb new technologies and foster digital transformation (AfDB, 2019; Arias, et al, 2019). However, there is a persistent underskilling and overskilling (vertical) mismatch across the continent, with highly educated young people likely to be either unemployed or when employed not utilising their full skill set (Fox & Gandhi, 2021). This is accompanied by a lack of basic and foundational skills including the ability to use mobile technology for communication (skills shortages) among the less well-educated and informally employed (Fox & Gandhi, 2021). In addition, as African countries grow their economies and expand education, underemployment becomes more of a problem. Analyses confirm this, with the World Bank STEP survey finding 40% of the labour force in Ghana and 25% in Kenya reporting their education exceeding the requirement for their job, and the ILO skill mismatch measure finding the highest rates of overskilling in lower-middle income (LMIC) countries (Fox & Gandhi, 2021). Along similar lines, in Rwanda, the combined rate of unemployment and underemployment is 41% higher than the unemployment rate, while in Kenya the underemployment rate is 20% compared to an unemployment rate for the general population of 7.4% (EARF, 2018). As one of the strongest economies in East Africa, 30% of employers in Kenya identified an inadequately skilled workforce as a barrier, both in terms of the skills needed to meet existing demand, as well as future digital skills driven by digital transformation and the fourth industrial revolution (4IR) (Youth Impact Labs, 2019).

[17] The third sector is an umbrella term covering different organisations and structures as part of civil society. It includes non-governmental and non-profit organisations, charities, and think tanks, amongst others. Third sector organisations are neither public sector (i.e., the state) nor private sector (i.e. profit making private enterprises).

The specific digital skills noted as missing include data science, network, hardware, and software maintenance for ICT administrations, software and systems development, and engineer skills (Youth Impact Labs, 2019).[18]

Employers in SSA have also cited a lack of socio-emotional skills as a key reason why they do not hire youth who have recently graduated (Fox & Gandhi, 2021; Filmer & Fox, 2014). This adds a further layer of complexity to the mismatching of skills, with employers singling out skills gaps among well-educated youth. These socio-emotional, or behavioural skills are linked to the foundational skills required to develop higher-order cognitive and technical skills through further education and training.[19] They range from numeracy and literacy to basic 'soft' skills like self-regulation and confidence, teamwork, managing emotions, and self-confidence (Filmer & Fox, 2014; Puerta et al, 2016). This emphasises a lack of basic or foundational skills required to develop more advanced and technical skills down the line. Therefore, in addition to the imbalance between the number of young people leaving education and seeking formal work compared to the number of opportunities available - the youth talent pool lacks the skills needed for the few available positions, alongside the skills needed for future jobs and employment through digital transformation (WEF, 2017).

As a result, skills deficiencies undermine the transformational potential of SSA, with basic skills needing to be taught early as a prerequisite to continued and life-long learning needed for digital transformation (Fox & Signé, 2022; World Bank, 2019a).

Education Failing to Teach Foundational and 'Soft' Skills

Education across the digital skills spectrum is key for digital transformation, however, the development of technical and 4IR ready skills requires the equitable provision of foundational and more basic digital and 21st-century skills (van Laar et al, 2020; World Bank, 2018). This is where skills development at the primary and secondary level plays a key role. However, across the whole of Africa educational enrolment is a concern. In 2019, there were 105 million children not enrolled in school - a growing trend since 2000 largely due to the number of out of school adolescents and youth of secondary school age (AUC, 2021). Persistent gender gaps are also a key problem, with a gender parity index in SSA below 1 based on the number of girls and boys enrolled in all levels of education, with 84 to every 100 boys attending upper secondary education (UNESCO 2021a).[20] Taking the adult population into consideration, only 8% of women and 14% of men in Burundi had at least a primary-level education, representing some of the lowest figures in the region. In Tanzania, where educational attainment at the primary level (at least) was the highest, 59% of women and 71% of men had a primary-level education. The same figures for women and men respectively, were 47% and 55% in Kenya, 27% and 36% in Rwanda, and 24% and 42% in Uganda (UNCTAD, 2018).

[18] According to the breakdown of digital skills mentioned in Box 1, these would range from Highly Specialised to Specialised/Advanced digital skills.

[19] Social and emotional skills as noted by the OECD refer to the ability to regulate one's thoughts, emotions and behaviour. They differ from cognitive abilities such as literacy or numeracy as they are more focussed on how people perceive themselves and engage with others. The development of these skills is important for both the well-being of the individual and for wider communities and society (Puerta et al, 2016; OECD, 2020).

[20] Data taken from the UNESCO Institute for Statistics (IUS) database.

Unqualified Educators & Outdated Curricula

While improving enrolment is a fundamental step, so is the quality of the education and skills being taught. In 2018, over 200 million young people were not achieving minimum proficiency levels in education outcomes, with 65% of teachers in a multi-country study stating the curriculum does not prepare students with the soft skills required for the labour market, such as innovation, creativity and critical thinking (ACET, 2022; UNESCO, 2021a).[21] Moreover, these digital skills uptake and teaching gaps are not limited to lower levels of education. Post-secondary education systems are also struggling across SSA,[22] with for example university educated workers in Ghana and Kenya failing to pass reading comprehension tests, and engineering graduates being low in number and lacking the technical skills required for the industry (Arias et al, 2019). This is exacerbated by little interaction between universities and local labour markets, and the updating of curricula to match the needs of employers, resulting in graduates facing difficulties finding work (Arias et al, 2019; Fox et al, 2020).

The lack of foundational skills being effectively taught across the education spectrum outlined above is made worse by the observed declining rates of qualified teachers. In SSA, the percentage of qualified primary teachers decreased from 71% to 65%, linked to the increase in contract teachers with lower academic qualifications and in service training (Teacher Task Force, 2020). At the primary level, for example, qualified teachers in Togo are only 43% and around 60% in Angola, Equatorial Guinea, Ghana and Sierra Leone (UNICEF, 2021). This is partly due to increased enrolment at all education levels (despite enrolment overall still being a concern) meaning unqualified teachers are employed, and because many who do have sufficient subject knowledge move to more attractive and financially rewarding sectors (Tikly et al, 2018).

Utilising Digital Pedagogy & ICT Integration

In efforts to address the gaps in qualified teachers and educators, Teacher Professional Development (TPD) strategies should be designed to make sure in-service teachers integrate ICT into their classrooms, and that teachers themselves are engaged in lifelong learning with a particular focus on digital skills and ICT pedagogy within curricula (Barakabitze et al, 2019). The use of Education Technology (Edtech) should be increased in line with the Strategy for Digital Transformation 2020-2030[23], which if leveraged effectively would provide concrete support to traditional teaching methods and help provide pupils with the needed skills for digital tool use (Barasa, 2021; Ganimian et al, 2020; Mendez & Evans, 2021). The use of Edtech for teaching should go alongside a focus on digital skills and digital literacy within curricula, ensuring the gaps presented above in relation to foundational and basic digital skills are overcome.

[21] The African Center for Economic Transformation research focussed on Côte d'Ivoire, Ethiopia, Ghana, Niger, Rwanda and Uganda.

[22] The low quality of tertiary/university level teaching seen across the region is not reflected in South Africa.

[23] The Strategy outlines plans to incorporate ICT training as part of pre-service and in-service training for all teachers, alongside improvements in both formal and informal education in ICTS.

Digital Skills & Private Sector Links: Leveraging the Potential of TVET

Technical and Vocational Education and Training (TVET) is often viewed as crucial for digital transformation. This is because it is believed to help develop the key digital and technical skills needed to drive innovation, productivity and employment (Monga et al, 2019). However, TVET enrolment is low across the continent with on average only 3% of 15 to 24-year-olds enrolled (AUC, 2021). Moreover, provision is almost non-existent at the lower secondary level, with a 1.6% enrolment, which rises to only 15% at the upper secondary level (AUC, 2021). It is also argued that TVET is offered too often to students as a substitute for general secondary education, resulting in students not having the required foundational digital skill base provided through formal education (Fox & Signé, 2022). Alongside the evident gaps in enrolment, the quality and cost have been critiqued, with it being noted programmes fail to deliver value for money (Fox, 2019; Hamory Hicks, 2016). Wider barriers to impactful and accessible TVET replicate the barriers seen across the education system including a lack of quality facilities which are often obsolete or damaged, and inadequate human resources given the insufficient number of competent teachers and absence of professional development (Monga et al, 2019; Tikly et al, 2018). Additionally, insufficient investment in technologies, and outdated curricula are further key barriers, with systems not well linked with the needs of employers and the labour market (Haßler & Haseloff, 2022). Alongside this, issues have been noted due to complex national qualification frameworks (NQFs) that are difficult to implement (Arias et al, 2019). These interlinked failings in TVET have highlighted the need for cross-sector input to improve curricula, links with industry, and the provision of the relevant skills (AUC, 2021).

However, TVET when designed carefully, targeted well, and with strong links to labour demand and the job market can have payoffs that increase over time as seen in other regions of the world (Arias et al, 2019). The challenges to be overcome in SSA are the weaknesses in national strategic frameworks and service delivery. While governments in the region have made steps in the right direction by putting greater emphasis on workforce development through TVET strategies, work still needs to be done to move on from conceptualisation to policy implementation to foster long term impact for youth employment and digital skills building (Arias et al, 2019). Moreover, countries including Botswana, Ghana, and South Africa are reforming their TVET systems but clear evidence on what works best is not readily available (Brown & Slater, 2018). As an example, while South Africa has made efforts to reform its TVET system in line with the German dual system, challenges being faced include a lack of private sector engagement, and capacity and resource constraints (Brown & Slater, 2018).

In efforts to address some of the challenges faced for effective TVET, East African countries have begun cooperating in TVET after adopting the Regional TVET Qualifications Framework (IUCEA, 2022). Geared towards mainstreaming regional qualifications into national policies and qualification frameworks, and improving overall TVET standards, it is envisioned the framework will promote the regional mobility of students and skilled workers (IUCEA, 2022). Public and private interventions have also been introduced to help improve the impact of TVET, as illustrated with the example in Box 3 below.

Box 3: Better Education for Africa's Rise Initiative (BEAR)

The Better Education for Africa's Rise Initiative (BEAR) project was introduced with the aim of supporting the education and vocational training sector in five selected countries in the Southern African Development Community (SADC).[24] With a total budget of USD 10 million (Galguera, 2018)[25] the main aim of the BEAR I project (2011-2016) was to contribute to the promotion of a technical and vocational education and training (TVET) system relevant to the needs of the labour market. BEAR stakeholders conducted labour market analyses in each country of selected industry sectors, identifying skills gaps. These analyses were instrumental in the development of informed national TVET curricula, which enabled the implementation of significant progress in increasing the relevance of vocational education and training to labour market demands (UNESCO, 2016).

BEAR II

Building on the knowledge and experience of the first BEAR project, BEAR II (2017 - 2021) was launched. BEAR II targets five East African countries[26] with a focus on three key areas: making TVET more relevant to the needs of the economy and the labour market, improving the quality of TVET programmes and institutions and improving the perception of TVET among young people, businesses, and society (UNESCO, 2017). With the aim of contributing towards the aims and objectives of CESA, a focus is placed on the demands of emerging digital economies and the requisite digital skills. This includes the digital skills needed for agro-food processing in Uganda, agri-business in Tanzania and environmental technology in Kenya.

To continue progress in boosting the impact and effectiveness of TVET, several strategies and focus points could be developed. These include, as noted by Arias et al (2019) and in line with the discussions above, a focus on:

- Foundational skills including foundational digital skills due to their scarcity among TVET students in particular from less affluent backgrounds, and the insufficient teaching of these skills as part of TVET curricula. This would also help prepare students with the 'soft' skills needed for adaptability to changes in the labour market.
- A two-pronged approach focussing on inclusion through economic and digital transformation. This could include prioritising catalytic sectors with a strong private sector interest and a more advanced digital skills focus, while also focussing on supporting TVET for low-skill occupations and in the informal sector. This is especially crucial as many young people are involved in informal sectors, which is likely to continue over next couple of decades.
- Regular monitoring and evaluation of the links between TVET and the labour market, and assessments on the effectiveness of training and skills development for youth employment.

[24] Botswana, Democratic Republic of Congo, Malawi, Namibia and Zambia.

[25] A joint initiative of UNESCO and the Republic of Korea: Better Education for Africa's Rise (BEAR).

[26] Ethiopia, Kenya, Madagascar, the United Republic of Tanzania and Uganda

Digital Skills to Boost Productivity in Informal Sectors

In line with the observations above on the gaps present in foundational digital skills education, the skills mismatch present in the labour market, and employment and underemployment trends across Africa for youth - interventions in informal job sectors should be leveraged. Delving into the specifics of employment within sectors across SSA is important here, because as for many low income (LIC) and lower-middle income (LMIC) countries where employment in the agricultural sector is high - employment in farming often fails to sustain households above the poverty line (Beegle & Christiaensen, 2019).[27] Resultantly, people often work in multiple sectors (usually non-farm self-employment) and have 'mixed livelihoods'; a trend particularly common in rural areas across SSA (Filmer & Fox, 2014; Yeboah et al, 2020). This is also often the case for well-educated youth who are unable to find gainful formal sector employment due to the mismatch of skills (ILO, 2018).

Therefore, interventions that increase productivity in traditionally low productive sectors like agriculture have significant potential for both young people unable to find gainful employment, and people from rural areas with low foundational digital skills and education levels (Fox & Gandhi, 2021). [28] Types of intervention targeted at certain groups require specific and tailored digital skills education strategies. For example, if low-skilled agricultural labour is to improve productivity and boost earnings, farmers will need effective basic literacy, digital, cognitive and problem-solving skills coupled with information on what technology to use and when (Fabregas et al, 2019; Fox & Signé, 2022). This is key if digitalisation is to modernise the sector by upgrading all stages of the value chain, utilising big data and ICT platforms to develop new business models, and connecting farmers and agricultural producers to new markets (Brown & Slater, 2018). Similarly, disruptive technology, if used effectively, can provide competitive prices and monitored crop information, and support for disaster mitigation (Ndung'u & Signé, 2020). Considering that 60% of total employment in SSA is in agriculture, alongside a considerable number of women, this reiterates the potential of digital skills in informal sectors (Ndung'u & Signé, 2020). The services sector is another area of potential based on being one of the fastest growing sectors in the region, with significant potential for job creation and skills development (Brown & Slater, 2018). The services sector includes a large informal aspect made up of household enterprises, with good foundational digital skills being key to developing business and management skills, and marketing and entrepreneurial capacities (Brown & Slater, 2018). These foundational digital skills are integral for small businesses to access government services or online banking, or to use mobile apps to connect with people and customers, while more advanced digital skills for digital marketing, coding and website design, and cloud computing or machine learning have the potential to modernise the sector further for increased job creation (IFC, 2021). Ensuring these digital skills are being developed is key as the services sector has the highest rate of digital adoption, with it being predicted to reach 40 to 65% of all services jobs by 2030 (IFC, 2021).

[27] It is noted until countries reach upper-middle income level (UMIC) informal sector employment will be the norm. This is because of a shortage of wage employment opportunities relative to the supply of labour.

[28] Interventions can also be made to increase output and employment in high productivity sectors. These sectors include wage employment within industry and services (public and private) including financial services, mechanical and electrical engineering, telecommunication, and health services, amongst others.

1.2 The Digital Divide & Gaps in Digital Infrastructure

Connectivity and infrastructure are bottlenecks to digital transformation across SSA as detailed previously, with women facing a triple burden reflected in a digital, rural, and gender divide according to the GSMA Mobile Gender Gap Report 2020. As an example, the gender gap in mobile ownership in Uganda is five times higher in rural areas than in urban settings (4% and 22% respectively). Similar trends are seen in Senegal (GSMA, 2020). To try and reduce the triple burden faced by women, the GSMA launched the Connected Society Innovation Fund for Rural Connectivity to support innovative mobile internet connectivity solutions for rural communities (Ruhani & Lock, 2019). These are now being developed in rural sites across Ghana and Uganda (GSMA, 2022).[29] Similarly, SMART Africa represents a high-level partnership bringing together Heads of State of the African Union, the World Bank, the African Development Bank and the private sector to promote affordable access to broadband. So far 114 ICT related projects are being implemented across the continent in line with the Programme for Infrastructure Development in Africa (PIDA) (Ruhani & Lock, 2019).[30] Despite efforts to tackle the digital divide, gaps in access to digital infrastructure were amplified because of the impact of the COVID-19 pandemic on education and employment.

The Negative Impact of the COVID-19 Pandemic

The socio-economic impact of the COVID-19 pandemic saw SSA go through a recession of minus 1.93% compared to the annual growth of more than 3% between 2017 and 2019 (IMF, 2021a). Lockdown measures led to the loss of 7.7% of working hours, and 9.4% of labour income, resulting in 34 million Africans being pushed into extreme poverty in 2020 (Lakner, et al, 2021; UNESCO, 2021a). Young people suffered the brunt of this, reiterating the unequal burden of the pandemic. For example, while the number of people in employment fell by 4 million in 2020 when compared to 2019, 3.6 million of these were young people - this led to a fall in youth labour force participation by 2.4% within a year (ILO, 2021).

Moreover, the pandemic reiterated the lack of adaptability in labour markets across SSA due to social distance measures having a disproportionately negative impact on workers in the region compared to globally (Fagbemi et al, 2022). This is because SSA has a significantly lower percentage of employment that can be done at home, with it being estimated only 16% of workers can work online (telework) when compared to 40% in developed countries (Dingel & Neiman, 2020; Fadinger & Schymik, 2020). A key element of this is the distribution of employment across occupations in the region, with elementary occupations[31] often involving routine tasks without technology accounting for over 70% of rural employment which has the lowest tele-workability (IMF, 2021b).

[29] The Connective Society programme is funded by the UK Foreign, Commonwealth and Development Office (FCDO) and the Swedish International Development Cooperation Agency (SIDA). This reiterates the role of Official Development Assistance (ODA) in digitalisation and digital transformation.

[30] PIDA is strategic framework for the development of regional and continental infrastructure including for ICT led by the African Union Commission (AUC).

[31] The ILO through the International Standard Classification of Occupations (ISCO) breaks down the skill level needed for different occupation groups. Elementary occupations are classified as requiring the first ISCO skills level due to the tasks performed usually consisting of simple and routine tasks with hand-held tools (e.g., selling goods in the street, cleaning and washing, sweeping streets, garbage collection, etc).

Analysing the impact of the pandemic on employment in Ethiopia and Nigeria, the IMF (2021b)[32] observed that while more jobs were lost in rural areas, it was more common for men to lose jobs across the board. However, a key caveat here is the number of women who are involved in informal agriculture where a loss of activity does not necessarily translate to a loss of employment (Fagbemi et al, 2022; IMF, 2021b). Moreover, it is noted that rural women in general are the most vulnerable due to a lack of decent employment and a high poverty rate, meaning they are likely to be hit hardest by household income losses because of the pandemic (IMF, 2021b).

The pandemic saw school closures across the continent lasting from 11 to over 40 weeks, with the more extreme cases seen in Eastern and Southern Africa lasting for a full year between March 2020 and March 2021 (UNICEF, 2022). This resulted in African policymakers having to implement a variety of solutions for ICT, remote, and distance-based learning to counter the disruptions to education that took place. These ranged from paper-based take-home learning materials, to broadcast media lessons using radio, TV and digital platforms (AUC, 2021). The unpreparedness of education systems to adapt was evident, with household data showing that SSA lacked sufficient devices and internet access to sustain these forms of learning for all students (AUC, 2021; UNESCO, 2021a). Resultantly, education across youth groups was affected, with the level of uptake in online classes varying from country to country in general, and within countries based on location, socio-economic status, and gender (Tsikata & Torvikey, 2021).

As an example, the COVID-19 High-Frequency Dashboard[33] noted that while 9 in 10 children were engaged in learning activities in Burkina Faso and 6 in 10 in Nigeria, only 3 in 10 in Mali and 2 in 10 in Malawi were engaged (Paci, 2021). According to The Education Partnership Centre (TEP), of an estimated 34 million students in Nigeria who missed out on learning opportunities – around 70% did not have access to essential digital devices (Olanrewaju et al, 2021). Afrobarometer data[34] further confirmed this, with almost two-thirds of households in urban areas having a smartphone, a computer, or both – and only 29% having the same access to devices in rural areas (Krönke, 2020). Moreover, across SSA the figures are more extreme – with 89% of students having no access to computers and 82% unable to access the internet (Olanrewaju et al, 2021). Access was also more common among more affluent households, with socio-economic status impacting access to online learning experiences (Adarkwah, 2021).

A lack of ability among teachers to facilitate e-learning was also noted, which is a gap replicated across the region based on limited institutional capacity to support teachers, and a lack of coherent policies and funding streams to support learning for the most vulnerable (e.g., measures to specifically support the education of girls through improved access to infrastructure, subsidised devices, and tailored learning materials) (Adarkwah, 2021; OECD et al, 2021). Less than half of countries across Africa took measures to ensure the inclusion of at-risk populations, including 39% for learners with disabilities and 24% for those in remote areas (UNESCO, 2021a). Moreover, instructions on distance teaching were only provided to educators in 27% of countries across SSA, while ICT tools and internet access were only offered to educators in 12% of countries across the region (UNESCO, 2021a).

[32] While the report raises the limitations of applying the findings of two large countries to the rest of SSA, it provides key insights for low to middle income countries, or those with large informal employment in the agricultural sector.

[33] Data taken from the World Bank Household Monitoring Dashboard which presents harmonised indicators from high-frequency phone surveys.

[34] Data taken from 34 countries across Africa.

The above gaps in access to learning have resultantly exacerbated the digital divide and deepened already present inequalities based on connectivity gaps, a lack of digital infrastructure, and access to devices preventing continued learning (UNESCO, 2021b).

The Need for Resilient Education Systems for the Marginalised

While the pandemic has opened doors to digitalisation, it has also highlighted the urgent need to rethink ongoing efforts to transform education systems with a focus on digital skills and literacy - and reinforced the need to accelerate the implementation and use of digital technologies (UNESCO, 2021b). A key aspect of this is in addressing the bottlenecks in digital transformation outlined above, including connectivity, digital skills pedagogy, and the digital divide through both access to devices and the skills and literacies needed to utilise them. This is crucial if SSA, with an overall learning poverty rate of 87%, is to avoid long-term negative education outcomes because of the pandemic (AUC, 2021).[35]

Basic education with a focus on those being left behind will need continued investment, alongside a search for new financing models to support the continued upgrading of post-primary education (Fox & Gandhi, 2021). Moreover, interventions need to boost basic digital skills and literacy as these are needed for young people to go on and master the more complex 4IR related digital skills required for the future. Countries will not benefit fully from the transformative potential of 4IR technology if skills, development programming and public expenditure are targeted mostly towards the higher-educated who can enter tertiary education (World Bank, 2018).

1.3 A Siloed Approach to Digital Skills Development

While interventions to increase infrastructure development are key in tackling the first level of the digital divide, providing young people with the relevant digital skills to be able to utilise digital technology is essential (James, 2019; Ndulu et al, 2021). However, ensuring these digital skills interventions are not just sustainable but also scalable in the long run is paramount. Examples exist where promising initiatives with the potential for continued and future impact fail to be leveraged, as shown in Box 4 below.

Box 4: Girls Can Code Project

Implemented by WiderNet, the Girls Can Code Project in Ethiopia aimed at breaking down the barriers to Science, Technology, Engineering, and Mathematics (STEM) education faced by women. It was a 30-week course giving girls the digital skills needed to pursue STEM careers. However, despite the cited positive impact with the majority of the 40 girls in attendance going on to university education - it was discontinued due to a lack of government funding with no sustainable alternative financing model in place (Ruhani & Lock, 2019).

[35] The World Bank introduced, in 2019, the concept of 'learning poverty' as the inability to read and understand simple text by the age of 10.

In contrast to the above example of a promising initiative failing to be followed up and extended, the below examples (Box 5) highlight how impactful programmes can be when long-term and sustainable financing is secured.

Box 5: African Girls Can Code & AkiraChix

The African Girls Can Code Initiative was launched in 2018 by the African Union Commission, the International Telecommunication Union (ITU), and UN Women (AUC, 2018; Ruhani & Lock, 2019). Equipping women aged 17 to 25 with ICT and digital skills across SSA through a 4-year programme, the first camp was held in 2018 in Ethiopia with 120 participants and reached 600 women (ITU, 2022). The programme is now in its second phase, launched on International Girls in ICT Day and will equip over 1,000 more women with digital and ICT skills, alongside advocating for and supporting gender mainstreaming in ICT policies and education curricula at the national level across AU Member States (UNGEI, 2022; UN Women, 2022).

Moreover, the not-for-profit AkiraChix project in Kenya is another success story. The project helped women and girls in informal settlements and slums in Nairobi learn coding and digital skills resulting in over 80% of the 250 plus young women being gainfully employed (AkiraChix, 2020).

Boosting Policy Coherence for Mutually Enforcing Outcomes

The previous examples of programmes and initiatives to boost digital skills learning and tackle the digital gender divide reiterate the need for policy coherence in interventions. They also show the importance of alternative training programmes across the public, private, and third sectors in helping address low digital skills, the gaps in formal education, skills mismatch, and the need for gender mainstreaming. Securing multiple actors through public private partnerships (PPP) where possible are a useful strategy to create longevity.

So far, this paper has discussed the key interrelated drivers and barriers to equitable digital skills learning, digital transformation, and employment across Africa with a focus on SSA. The following section narrows this down and presents examples and best practices from Kenya, Ghana, and South Africa to provide further national context to the broader discussions above.[36] It then summarises the key findings in relation to programmes and policies to improve digital skills uptake, informal sector transformation, and the digital divide.

2.1 Kenya

Background

Kenya is the strongest economy in East Africa and has one of the oldest and most thriving innovation ecosystems in SSA. Numerous investments in digitalisation and its growing number of innovative start-ups have earned Nairobi's dynamic ICT scene the nickname 'Silicon Savannah' (GIZ, 2018; OECD, 2021). Kenya is often seen as ICT savvy in the region, with the ICT sector expected to drive digital transformation (Okyere, 2022). This is because within East Africa, Kenya is a large and fast-growing economy with some of the highest digital literacy rates and mobile phone penetration (IFC, 2021). However, Kenya's readiness for digital transformation is not being utilised fully based on digital skills gaps, with the country rife for upskilling (UNESCO, 2022).

Challenge: Digital Skills & Gender

According to a labour market analysis by the World Bank and the IFC, by 2030 50-55% of jobs in Kenya will depend on digital skills - this is up from 25-30% in 2019 (Caballero & Bashir, 2020). This spans the agriculture, industry and services sectors, with it being predicted by 2030 Kenya will need 17 million workers trained in digital skills (IFC, 2021). However, one of the primary challenges in Kenya is the lack of 21st century and digital skills. This has been flagged by 30% of employers that identified an inadequately skilled workforce as holding them back, both in terms of the skills needed to cater for existing demand, and the future skills needed because of digital transformation and the 4IR (Puerta et al, 2018; Youth Impact Labs, 2019).

[36] To add further context to the situation in SSA and to help extrapolate key findings, the case studies focus on countries in each sub-region of SSA. This is based on South Africa being in Southern Africa, Kenya in Eastern Africa, and Ghana in Western Africa. Moreover, each country was chosen on the basis of an active policy and regulatory approach to digital skills development, with long-term programmes and interventions in place where lessons can be learnt and best practices extrapolated.

The low number of women and girls engaged in ICT courses and STEM is a cause for concern in Kenya. This is based on a 30 to 35% gender gap in participation, which rises as the education level gets higher despite interventions and policies in place (Adetunji, 2018). This gender gap has been linked to still prevalent gender stereotypes of certain types of education being for boys, and technical related careers being for men (Adetunji, 2018).

Policy Context

In 2016, Kenya's Ministry of Information, Communication and Technology implemented the Digital Literacy Programme (DLP).[37] The first phase, 'Learning to Use', with the aim of creating an integrated approach to learning in which teachers use digital devices and content, has been finalised. This saw 91,000 teachers trained across 19,000 primary schools, and more than 12,000 digital devices distributed to schools, pre-loaded with interactive digital learning content (Barasa, 2021). Labelled 'Use to Learn', the second phase began in July 2019 and focussed on establishing shared digital learning resource centres in schools. The third, 'Using to Produce' - focussed on the productive use of technology for job creation (Barasa, 2021). A large part of the programme's success has been the public-private partnership model engaged by the government to increase resources for ICT. Led by the ICT Authority and with financing from Huawei and Telkom Kenya - over 6000km of fibre has been laid out to improve connectivity and infrastructure (AUC, 2021). To date, the programme has seen 331,000 teachers trained in digital device use, and over 210,000 in technology use in line with competency-based frameworks (AUC, 2021). According to teacher surveys, it has increased learning through digital devices and has encouraged parents to send children to school resulting in increased student enrolment (Abuya, 2022; Ogolla, 2022).

This intervention confirms the crucial role of mobilising public financing for digital skills development, alongside the impact national governments can make when linking digital skills training in education institutions to the needs of the labour market. It also reiterates the role of private organisations in providing guidance on labour market trends.

[37] The programme was also under the brand name DigiSchool.

Box 6: The Ajira Digital Programme

The Government of Kenya through the Ministry of Information and Communication and Technology (MoICT) implemented phase 1 of the Ajira Digital Programme between 2017 and 2018 (KEPSA, 2022).[38] This aimed to bridge the gap between skills development and needs of the labour market. To date, the programme has established more than 200 Ajira Youth Empowerment Centres throughout Kenya providing internet access within walking distance even in rural areas (The Kenyan Wall Street, 2021).

Over 300 Ajira Digital Clubs have also been introduced in universities and TVET institutions, where young people learn about digitally enabled jobs, and build on the theoretical concepts in education by acquiring practical experience of the skills needed for the digital age (Egerton University, 2022). This is based on cooperation between universities and education institutions and international ICT companies, equipping higher-educational students with labour-market-driven digital skills (University of Nairobi, 2021; Wanja, 2021).

Young people are also provided with a mentor, learn the ‘soft’ skills needed to engage with employers and professionals, and avenues to find work and earn money through the digital economy and online (Egerton University, 2022). Youth in search of work can also find information about digital jobs on the Ajira Portal, as well as community and training support (Ajira Digital, 2022). The success of the programme has meant the number of trained youth has increased from 21,105 in 2018 to over 150,000 in 2022, while the number of youth working on digital and digitally enabled jobs has risen from 1.2 million in 2021 to 1.9 million in 2022 (Abuya, 2022; Fox & Signé, 2021; Kamau, 2022).

The work of the African Centre for Women & ICT (ACWICT) represents good practice in responding to the structural barriers hindering gender equality in education through three pillars: life skills, digital literacy, and digital skills (Ruhani & Lock, 2020). Trainings in these three pillars aim to prepare young women for finding digital-related jobs afterwards, equipping trainees with awareness of the digital environment and skills demanded by the labour market (see Box 7) (Ruhani & Lock, 2020).

ACWICT is now focussing on the access to and use of digital resources by women and young farmers to enable sustainable agricultural production. Guided by the research results by Mulema et al (2021) on the barriers and opportunities to youth engagement in agribusiness, the programme will focus on technology for digital agriculture, and the role of digital transformation for trade, and increased productivity (CABI, 2021). While this example is yet to come to fruition, it reiterates both the role of digital skills in modernising informal sectors with a specific focus on gender and development, and the role of international public financing based on being funded by the Digital Access Programme of the UK Government (CABI, 2021).

Moreover, the organisations shift in focus to agriculture also showcases the predicted impact of digital skills to boost productivity and employment within the agricultural sector, and its knock-on effect for youth employment through digital transformation.

[38] KEPSA is the Kenya Private Sector Alliance. It brings together local and international businesses, chambers of commerce, professional bodies, multinationals and Micro, Small and Medium Enterprises (MSMEs) from all sectors of the economy.

Box 7: The Vusha Project

Through the Vusha Project between 2014 and 2017 ACWICT aimed to improve the employability prospects and income generating capacities of 4,500 disadvantaged young women from low-income households and in informal settlements. With two phases, young people were trained in digital skills, online work skills, and financial literacy, and then linked with a network of 1,000 employers (World Bank Group, 2019). From 2014-2017, 19,927 young people received training from the programme, 3,555 of which generated income, 2,635 registered to online job platforms, and 920 were placed in digital jobs including data entry, online article writing, online sales, and app development. Those who receive long-term contracts received an average income three times higher than the minimum wage (CEIC, 2021; World Bank Group, 2019).

Despite the success of the project, it was noted the prohibitive cost of internet connectivity, the high cost of acquiring computers, and the lack of ICT hubs in rural communities prevented beneficiaries from expanding the amount of online work they did. This was coupled with unreliable power supply and frequent blackouts hampering continued learning and leading to some missing out on online opportunities (World Bank Group, 2019).

2.2 South Africa

Background

South Africa accounts for 49% of SSAs cellular connections and is the only country in the region to have launched commercial 5G services available in several locations across the country (GSMA, 2020). However, most of these efforts have been focused on urban areas - exacerbating the first stage of the digital divide in terms of access (Devermont & Harris, 2021). Youth unemployment is one of South Africa's key challenges. Before the onset of the pandemic, unemployment rates were just under 70% for those aged between 15 and 24. A year later this had increased to 74% even with government investment (Graham et al, 2021). Despite being lower in the first quarter of 2022 at 64%, when compared to a figure of 42% for 25- to 34-year-olds, youth aged between 15 and 24 continue to bear the burden of unemployment (Statistics South Africa, 2022).

Challenge: Digital Divide in Education

Equitable internet access in schools is a key issue. Access varies substantially by region, with for example only 1.7% of schools connected in Limpopo, compared to 28% in Johannesburg (Guruli et al, 2020). Race and income play a significant role here, both in schools that were traditionally white only, and across the population in general. This is a key challenge given the socio-economic context of South Africa, with over 80% of the population being black (Genesis Analytics, 2020). Moreover, it is noted early education outcomes that are key to foundational digital skills learning are marked by income disparities, with the wealthiest 10% of schools five times more likely to learn basic skills than the poorest 50% of schools (DCDT, 2021). This divide is linked to disparities in connectivity and infrastructure, with internet access only available in 21% of schools (DBE, 2020a).

Policy Context

Through the government's national broadband policy SA Connect, the government aims to connect public schools with fast and reliable internet (10 mbps by 2020 and 100 by 2030). However, to date, implementation issues are being faced. As of January 2020, the first target has not been met. Of the 970 sites (already a limited number due to lack of funds) - only 630 have achieved connectivity (Guruli et al, 2020). A commissioned review of the progress made found that the lack of implementation of the integrated infrastructure plan leveraging public and private investments that was proposed in the plan was a major factor in not meeting the 2016 and 2020 targets (Research ICT Africa).[39]

Digital Skills Policy

The Department of Communications and Digital Technology (DCDT) launched the National Digital and Future Skills Strategy aiming to tackle many of the skills gaps in schools mentioned above. The programme focuses on curriculum innovation, teacher pedagogy, and school connectivity and digital infrastructure. Key themes that are addressed are digital and future skills foundations, digital skills for the future of work, with a specific focus on young people who are not in employment, education or training (NEET). The strategy recognises that digital literacy skills and 21st century skills at the foundational level cannot be leapfrogged and are essential for life-long learning (Reddy et al, 2019). The policy also highlights the need to roll-out large-scale digital literacy programmes tailored to young people, alongside a focus on foundational digital skills programmes as learning pathways towards intermediate and advanced digital skills (DCDT, 2021).

Box 8: Coursera Digital Skills

Demonstrating the role of public and private financing, South Africa's Ministry of Communications and Digital Technologies partnered with the digital learning platform Coursera to offer online courses to young people. This included a focus on skills covering data science, digital marketing, coding, and app development (Fox & Signé, 2022). As part of the government's efforts to tackle youth unemployment, it aims to train one million unemployed youth in data science and more advanced digital skills to prepare them for the future of work in line with the 4IR, and to respond to the negative impact of the COVID-19 pandemic on youth employment (Business Insider SA, 2022).

Moreover, numerous non-governmental and private sector initiatives aim to bridge the skills gap, alongside interventions targeted specifically at women and girls. These include Code4CT and GirlHype - offering coding programmes to girls of different ages to help them acquire the necessary skills to access jobs in the technology sector (Strydom, 2016). Similarly, interventions are being introduced to tackle misinformation, with online platforms like TechGirl providing spaces for women and girls to seek help and advice on technology and digital resilience.

[39] The review was conducted by Research ICT Africa (RIA) and the University of Cape Town's Nelson Mandela School of Public Governance. It was completed in 2019 prior to the outbreak of the Covid-19 pandemic.

2.3 Ghana

Background

Ghana has seen strong economic growth over the past two decades, resulting in nearly a doubling of GDP per capita - lifting the country through the threshold for middle income status in 2011 (World Bank, 2021b). The economy is dominated by Micro, Small and Medium Enterprises (MSMEs) that have the potential to grow if digital technology is leveraged and digital transformation achieved (World Bank, 2021b). This has been recognised by the Ministry of Trade and Industry, noting the MSME sector is an important strategic sector for transforming lagging regions and districts in terms of digitalisation, and a means to provide employment to vulnerable groups including women, youth and low-skilled workers (Ministry of Trade & Industry, 2022). Employing more than 80% of the workforce and generating 70% of national output, driving technological change in this sector has significant potential (World Bank, 2021b).

Challenge: Equitable Growth & Jobs for Low & Mid-Skilled Workers

Despite the strong economic growth seen in Ghana, the growth path of the country has not been equitable, with growth in GDP per capita ranging from +11.3% to -0.11% (World Bank, 2021a). As a result, inequality and spatial disparities are key issues, which have been widened further due to the significant negative impact of the COVID-19 pandemic on Ghana's economy.[40] Moreover, Ghana faces an acute jobs challenge as a result of high-performing services sub-sectors employing only a small number of workers, a manufacturing sector with low productivity, and the bulk of jobs available in informal sectors (World Bank, 2021a). Resultantly, there is a lack of mid-productivity and mid-skilled jobs for workers moving out of agriculture (World Bank, 2021a). Boosting productivity in informal sectors alongside generating more and better jobs for vulnerable groups, and low and mid-skilled workers are therefore key moving forward. Ensuring equitable digital skills uptake is also paramount, especially due to it being estimated that by 2030, over 9 million jobs in Ghana will require digital skills, translating to roughly 20 million training opportunities (FAO, 2022; IFC, 2019).[41]

Policy Context

Policy interventions have been made to boost infrastructure and connectivity in schools through the Ghana Integrated ICT Accelerated Development (ICT4AD) Policy. The current 5th ICT4AD Rolling Plan (2019-2022) aims to place greater emphasis on the production, development and delivery of ICT products and services through the provision of hardware and internet access for all educational institutions.

For Ghana to reach its economic and development goals, the Ministry of Education introduced several initiatives including the sending of laptops to schools under the 'one laptop, one student policy' (Adarkwah, 2020). This was scaled up to 60,000 devices and distributed to 2500 high schools. However, it has been noted that many of the efforts to promote access to technology and digital skills education have not been as successful as planned. This is based on the integration of ICT in teaching and learning still at the early stage in education systems, alongside being skewed towards schools in urban schools in urban areas and private schools (Antwi et al, 2018).

[40] In 2020, GDP growth decreased to 0.4%. This was down from 6.5% in 2019 (World Bank, 2021a).

[41] This is based on the requirements for both training new market entrants and training existing market participants.

Resultantly, despite significant investment in ICT, challenges still persist in integrating ICT and digitalisation into teaching and learning, especially in rural and underprivileged areas (Adarkwah, 2020).

Digital Initiatives & TVET

The need to boost growth and MSME resilience has been recognised by the national government, which has plans to expedite digital initiatives brought about during the COVID-19 Alleviation and Revitalisation of Enterprises Support (CARES) Programme (World Bank, 2021). TVET has been a key policy priority across the country. The government through the Ghana Skills Development Initiative (GSDI III) together with the Council for Vocational Education and Training (COTVET) introduced 22 sector skills councils to help define and develop occupational standards underpinning competency-based curricula and a national qualification TVET framework. A focus of this initiative is on building a skills system that will produce a demand-driven labour market (CTVET, 2021).

Ghana Digital Acceleration Project

Demonstrating again the role of external financing, the World Bank allocated \$200 million to help the government of Ghana increase access to internet infrastructure and strengthen the digital innovation ecosystem for growth and jobs (World Bank, 2022). The project aims to support regulatory shifts and foster an enabling environment with a focus on digital inclusion, and the delivery of public services, and to facilitate smallholder engagement in data-driven digital agriculture (World Bank, 2022).[42]

Box 9: Esoko Project

The project focussed on providing information and data to smallholder farmers to help navigate increasingly complex global food chains. By using multiple data sources including government data, the project helped farmers secure better prices for their produce and level the playing field between farmers and buyers (van Schalkwyk et al, 2020).

According to estimates, Esoko has reached 350,000 farmers in 10 countries, while in Ghana 29,344 data-sharing calls have been made. An empirical study was conducted on Esoko's market price information, finding that farmers using Esoko information received fairer prices for their produce (Courtois & Suvervie, 2014).

A key factor in ensuring the impact of interventions like this is maintained in the provision of digital skills and literacies needed to use the mobile technology, and the infrastructure present (van Schalkwyk et al, 2020). The project, therefore, reiterates the role of basic and foundational digital skills in fostering digital transformation within the agricultural sector. Moreover, it demonstrates the potential to boost economic output in low-productivity sectors which can have knock-on effects on decent work and youth employment (Brown & Slater, 2018).

[42] The project is expected to increase access to mobile internet and broadband for 600 million people. It builds on previous investments including the e-Transform Ghana project.

Conclusion

As detailed throughout this paper, SSA will need a more diversely skilled labour force to absorb new technologies and foster digital transformation (AfDB, 2019; Arias, et al, 2019). However, there is a persistent overskilling and underskilling problem across the continent, with highly educated young people likely to be either unemployed, or when employed not utilising their full skill set (Fox & Gandhi, 2021). This is accompanied by a lack of basic and foundational skills among the less well-educated and informally employed (Fox & Gandhi, 2021). Resultantly, skills mismatches and skills deficiencies are key barriers to the transformational potential of digitalisation across the continent, spanning the entire digital skills landscape. This digital skills landscape can be broken down into four proficiency levels ranging from basic or foundational, to intermediate, specialised, and highly specialised (IFC, 2021; World Bank, 2020). These proficiency levels are linked to sector modernisation, and the types of skills needed to foster decent work. The equitable uptake of digital skills and digital literacy is therefore paramount looking to the future, with the relevant interventions required to respond to the challenges faced by digitalisation, the skills-intensive nature of 4IR technology, and the changing demands of the future of work (Fox & Signé, 2022; UNFPA, 2022). These interventions must be inclusive and reach marginalised groups, with poorer youth and those in rural areas most at risk of being left behind due to limited access to education and training, and electricity and ICT services (Fox & Signé, 2021). Moreover, specific efforts must be placed on tackling persistent and widespread gender divides, with vulnerable and marginalised women and girls most at risk of being left behind.

Along similar lines, digital inclusion does not guarantee social inclusion, with skills gaps between groups of people resulting in varied abilities to make use of digital technology. Therefore, the context in which the rural poor are living is key in devising strategies and interventions to close the second level of the digital divide (the sophistication of use and user expertise) (Livingstone & Helsper, 2007).

Building the Foundations for Digital Transformation

To foster digital transformation across a variety of sectors, key digital skills and literacies need to be taught at all levels of education, ranging from primary to secondary and post-secondary levels. A key aspect of this, linked to the widespread mismatch of skills through overskilling and underskilling, is the provision of fundamental foundational digital skills – the skills required for continued life-long learning and gainful employment. This is particularly crucial as the opportunity to develop good foundational skills reduces over time, with adult education programmes having less success compared to early interventions (World Bank, 2019b). Resultantly, it is key to boost early childhood education to ensure young people learn foundational skills (and wider ‘soft’ skills) for continued life-long learning, to be able to make the most of later educational opportunities, develop digital skills, and be prepared for productive work with growth prospects, especially in light of the 4IR (World Bank, 2019b).

Fostering Digital Opportunities for Youth in the Informal Sector

Based on the sector breakdown of employment across the continent, a significant amount of young people will remain in informal sectors for decades to come. As a result, while efforts should remain in boosting the expansion of productivity in the formal sector, a key enabler of youth employment is in fostering change within the informal sector (Arias et al, 2019). Supporting self-employed and informal apprenticeships is key here, especially for people in rural areas or from marginalised backgrounds, as this is where some of the biggest economic inclusion gains can be made (Arias et al, 2019). The adoption of worker-enhancing digital technologies can boost the productivity of low-skilled workers - including informal sectors like agriculture - resulting in increased productivity, and job and economic growth (Choi et al, 2020).

Taking Advantage of Digitally Driven Agri-Food Systems

The agricultural sector is of particular promise here as digital transformation is already underway across SSA (FAO, 2022). As highlighted in this paper, digitalisation in the agricultural sector can be leveraged by offering opportunities for farmers and rural communities. Moreover, digitally driven agri-food systems have the potential to transform the perception of women and youth of the agricultural sector as a positive and fruitful source of job opportunities and decent work. This could achieve meaningful livelihood improvements, ensure rural areas are not left behind, tackle the digital divide, foster youth employment, and tackle the 'triple digital divide' through an inclusive approach to digital transformation (Ndulu et al, 2020; Ndulu et al, 2021).

Recommendations

In light of the evidence synthesised throughout this paper on the proficiency levels of digital skills and literacies, their fundamental role in sector transformation and the fostering of digitally-enabled decent jobs for youth, the importance of structural change for digital skills education, uptake, and application, and the key insights and lessons learnt from policy and practice - the following interventions are recommended spanning the entire digital ecosystem:

Improve the Quality & Relevance of General Education

- A strong focus needs to be placed on the equitable uptake of foundational digital skills in primary and secondary education. This is essential given the lack of foundational skills taught in schools, which is exacerbated by the observed declining rates of qualified primary-level teachers across SSA due to the growing number of contract teachers with lower academic qualifications and in-service training. Foundational skills education is needed to lay the groundwork for life-long learning by ensuring young people master the relevant soft and hard skills to be developed at later stages in life. Basic digital skills are required to master technical and 4IR ready skills in the future (van Laar et al, 2020; World Bank; 2018).
- African governments need to ensure that the relevant and required digital infrastructure, devices, and connectivity are accessible overall, and in schools with a specific focus on rural areas and marginalised groups. As shown in the South Africa case study, comparatively high levels of cellular connectivity when largely focused on urban areas exacerbates the first level of the digital divide in terms of access, and the second level in terms of digital skills uptake. This needs to be coupled with the adoption of ICT and digital tools for education among teachers through Teacher Professional Development (TPD) strategies. Lifelong learning for teachers with a focus on digital skills and ICT pedagogy, and the use of Education Technology (Edtech) also needs to be introduced in line with the Strategy for Digital Transformation 2020-2030.

Leverage the Potential of Technical and Vocational Education & Training (TVET)

- A strong focus needs to be placed on foundational digital skills learning in TVET as well, due to the lack of abundance and uptake among TVET students and especially those from less affluent backgrounds. Boosting foundational digital skills is key in preparing TVET students with the adaptability needed for labour market access, flexibility, and mobility.
- A two-pronged approach should be adopted to TVET digital skills curricula and learning outcomes. The first should prioritise advanced digital skills in catalytic sectors with a strong focus on the private sector in terms of both financing and labour market insights. The second should be geared towards improving the relevance and impact of TVET for low-skilled occupations and in informal sectors, with significant socio-economic outcomes possible in both the agricultural and informal services sectors. Linked to the above, cross-sector partnerships need to be encouraged to improve links between TVET and industry. This is essential in ensuring the right skills for the labour market are provided through direct input from employers. When designed carefully and targeted well through strong links to labour demand, TVET can see long-term payoffs. National strategic frameworks need to be bolstered to overcome current weaknesses in moving from conceptualisation to policy implementation (Arias et al, 2019). Moreover, interventions should be demand-driven through private sector engagement to ensure the desired impact and outcome for youth employment and digital skills building before scaling up.
- To foster improved transferability and recognition of the skills needed for gainful employment, African governments should learn from and build on the steps already made in harmonising TVET curricula and qualifications through the Regional TVET Qualifications Framework (IUCEA, 2022). Regional qualifications should be mainstreamed into national policies and frameworks alongside the improvement of overall TVET standards. This would have positive knock-on effects for both the mobility of students and skilled workers, alongside improving the often-negative perception of TVET as a pathway to decent jobs resulting in low enrolment rates.

Foster Policy Coherence to Realise the African Union Agenda 2063

- In line with the Digital Transformation Strategy for Africa 2020-2030, interventions across the entire digital ecosystem need to be bolstered to tackle the digital divide. Through the harmonisation of policies and regulations across the continent, with a focus on cross-border infrastructure, the right enabling environments for digital skills and innovation can be created. This policy coherence will see knock-on benefits across the entire digital ecosystem including education and training, digital infrastructure, and employment.
- From the national perspective, African governments need to solidify their national digital policies and implementation efforts through increased fiscal interventions and the required human resources. Securing and mobilising public financing for digital skills development while linking digital skills education to the labour market is paramount here, as showcased in the Kenya case study where government programmes and interventions to bridge the gap between education and employment were financially sustainable because of the relevant input from private organisations.

Mainstream Gender Equality in Digital Transformation Policies

- To further tackle the digital gender divide, a specific focus on gender mainstreaming within digital strategies and policies at the national, continental, and international level need to be enforced. Moreover, different policies for each sector ranging from infrastructure access to skills development programmes need to be introduced. Investigations into women empowerment show that countries with more comprehensive gender mainstreaming included in digital strategies see more impactful gender equity outcomes. Mobilising fiscal interventions to prevent unbalanced investment is key. International actors and EU investment should be leveraged here, building on the progress made in Digital4Development policy and ensuring gender mainstreaming throughout investments to be made to increase digital infrastructure, services, and jobs for youth and women in the upcoming 'Comprehensive Strategy with Africa'.
- Ensuring marginalised women and girls who are most at risk of being digitally excluded are not left behind is paramount to tackle the triple burden of the digital, rural, and gender divide. Building on the impact made through digital skills and literacy trainings outside of school to expand the opportunities for women and girls to develop digital skills is crucial looking to the future. As shown in the Kenya case study through the Vusha Project, targeting digital skills development programmes to disadvantaged women has a significant positive impact on employability prospects and income generation. Securing public financing for not-for-profit and third-sector interventions targeting marginalised women and girls is key so the progress made can be built on, ensuring impactful programmes with high success rates can have long term sustainability and scalability.

Target Digital Skills Development to Boost Productivity in Informal Work

- Digital interventions in informal job sectors have the potential to boost economic and social inclusion for people in rural areas, tackling unemployment and underemployment issues across the continent. To make the most of digital solutions and digitally driven agri-food systems, targeted basic and foundational digital skills learning need to be enhanced within the informal agricultural sector and for marginalised groups. This has the potential to improve productivity, boost earnings, and modernise the sector by upgrading all stages of the value chain if the right digital skills are utilised. This is further emphasised through the Esoko Project in the Ghana case study, whereby farmers were able to secure fairer prices for their produce by making the most of digital solutions - reiterating the role of basic digital skills in boosting economic inclusion.
- The digital gender divide can be further bridged by increasing productivity in traditionally low-productive and informal sectors, like agriculture and informal services. This is because young people, and in particular young women and girls are most likely to work in these sectors either informally or vulnerably. The provision of digitally-enabled jobs in these areas has the potential to increase the attractiveness of these sectors for youth, and to provide more and better jobs to foster social inclusion and development.

Secure Public-Private Partnerships (PPP) for Programme Sustainability

- Public-private partnership models are an essential means of securing the required expertise, industry knowledge, and financing for a wide array of interventions to foster digital transformation. It is therefore paramount to build on the positive impact seen through successful examples across the entire digital ecosystem to ensure long-term structural change through equitable digital skills uptake, increased connectivity, and gender equality. This should include partnerships with industry for labour market knowledge to improve education and TVET, collaborations with technology and telecoms companies for digital device access and connectivity, and links with civil society to boost interventions reaching marginalised groups.

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About INCLUDE

INCLUDE was conceived in 2012 by the Dutch Ministry of Foreign Affairs to promote evidence-based policymaking for inclusive development in Africa through research, knowledge sharing and policy dialogue. INCLUDE brings together researchers from African countries and the Netherlands who work with the private sector, non-governmental organizations and governments to exchange knowledge and ideas on how to achieve better research-policy linkages for inclusive development in Africa. Since its establishment, INCLUDE has supported more than 20 international research groups to conduct research on inclusive development and facilitated policy dialogues in Africa and the Netherlands.