

# African Union



## Digital Education Strategy and Implementation Plan

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## ABBREVIATIONS

Term	Description
<b>4IR</b>	4 <sup>th</sup> Industrial Revolution
<b>ACTDE</b>	African Certificate for Teachers Digital Education
<b>ADEA</b>	Association for Development of Education in Africa
<b>AfDB</b>	African Development Bank
<b>AfriNIC</b>	African Internet Registry
<b>AI</b>	Artificial intelligence
<b>ASREN</b>	Arab States Research and Education Network
<b>ATU</b>	African Telecommunication Union
<b>AU</b>	African Union
<b>BYOD</b>	Bring Your Own Device
<b>CDN</b>	Content Delivery Network
<b>CERT</b>	Computer Emergency Response Team
<b>CESA</b>	Continental Education Strategy for Africa
<b>CSIRT</b>	Computer Security Incident Response Team
<b>DigCompEdu</b>	Digital Competency Framework for educators
<b>DLP</b>	Digital Literacy Programme
<b>DOTSS</b>	Digital connectivity, Online and offline learning, Teachers as facilitators and motivators of learning, Safety online and in schools and Skills focused learning
<b>DTSfA</b>	Digital Transformation Strategy for Africa
<b>EA</b>	Enterprise Architecture
<b>EAC</b>	East African Community
<b>ECCAS</b>	Economic Community of Central African States
<b>ECD</b>	Early Child Development
<b>ECOWAS</b>	Economic Community of West African States
<b>EdTech</b>	Educational Technology
<b>Ed-DQAF</b>	Education Data Quality Assessment Framework
<b>EMIS</b>	Education Management Information System
<b>ESSP</b>	Education Sector Strategic Plan
<b>ESTI</b>	Department of Education, Science Technology and Innovation
<b>EU</b>	European Union
<b>FLIP</b>	Financing, Leadership, Inclusion, Partnerships

<b>Term</b>	<b>Description</b>
<b>GDP</b>	Gross Domestic Product
<b>GER</b>	Gross Enrolment Ratio
<b>GESCI</b>	Global e-Schools and Communities Initiative
<b>GPE</b>	Global Partnership for Education
<b>ICT</b>	Information and Communications Technology
<b>ICT-CFT</b>	ICT Competency Framework for Teachers
<b>IED</b>	Infrastructure and Energy Department
<b>IoT</b>	Internet of Things
<b>IRI</b>	Interactive Radio Instruction
<b>ITU</b>	International Telecommunications Union
<b>IXP</b>	Internet Exchange Point
<b>JRC</b>	Joint Research Centre
<b>LAN</b>	Local Areas Network
<b>LMS</b>	Learning Management System
<b>MOOC</b>	Massive Open Online Course
<b>NEET</b>	Not in Education, Employment and Training
<b>NER</b>	Net Enrolment Ratio
<b>NFE</b>	Non-Formal Education
<b>NREN</b>	National Research and Education Network
<b>OER</b>	Online Education Resource
<b>PAVU</b>	Pan Africa Virtual and e-University
<b>PRIDA</b>	Policy and Regulation Initiative for Digital Africa
<b>RECs</b>	Regional Economic Communities
<b>SADC</b>	Southern African Development Community
<b>SDG</b>	Sustainable Development Goal
<b>SMS</b>	Short Message Service
<b>STC</b>	Specialised Technical Committee
<b>TVET</b>	Technical and Vocational Education and Training
<b>UNESCO</b>	United Nations Education Scientific and Cultural Organisation
<b>UNICEF</b>	United Nations International Children's Fund
<b>WACREN</b>	West and Central African Research and Education Network

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## EXECUTIVE SUMMARY

Education is a sector that is fundamental to all other sectors. Moreover, it is a sector that stands on its own that benefits individuals and society. Today, digital technologies are imperative for working, learning, socialising, participating in societal debates and accessing information and public services. As such, a nation needs to ensure that its citizens are digitally empowered and capable of confidently participating in the digital economy and society and promote a digitally skilled workforce for a thriving knowledge-driven economy.

When applied effectively, digital technologies can enhance education quality, accessibility, and affordability. Digital education denotes the application of digital technologies in education and the education on how to use digital technologies (i.e., digital literacy and skills). Digital education can contribute to the African Union (AU) Member States' efforts in bridging the low level of access to education, especially for those living in remote areas, for girls, children and adults with disabilities and those on the move due to conflicts and natural disasters, enabling numerous out of school youth to learn, reducing the high adult illiteracy rate, lowering the limited participation in technical and vocational education and alleviating the limited number of skilled teachers, low completion rates, meagre learning outcomes and reducing the disconnect between higher education and the demand for relevant research and skills for the knowledge economy.

Digital education is vital for recovery and resilience in post-COVID-19 Africa and for preparing African youth for the ICT-enabled labour market. Moreover, it is critical for achieving African Union's Agenda 2063 vision – "well-educated and skilled citizens, underpinned by science, technology and innovation for a knowledge society."

The African Union Digital Education Strategy and Implementation Plan, which covers the period 2023-2028, establishes a framework for engagement and acceleration of adoption of digital technologies in alignment with the Continental Education Strategy for Africa. The Strategy proposes three main areas of focus, eight action areas and fourteen measures.

The three main focus areas are:

- i. **Digital technology appropriation in education** – accelerating the adoption of digital technologies for teaching, learning, research, assessment and administration, and
- ii. **Education in digital technologies for digitally empowered citizens/ for the digital economy and society** – strengthening digital literacy and skills for all, especially for teachers and students.
- iii. **Building the capacities of AU Member States in digital infrastructure (devices and networks)**. Infrastructure development is the primary strategic objective of the digital education strategy.

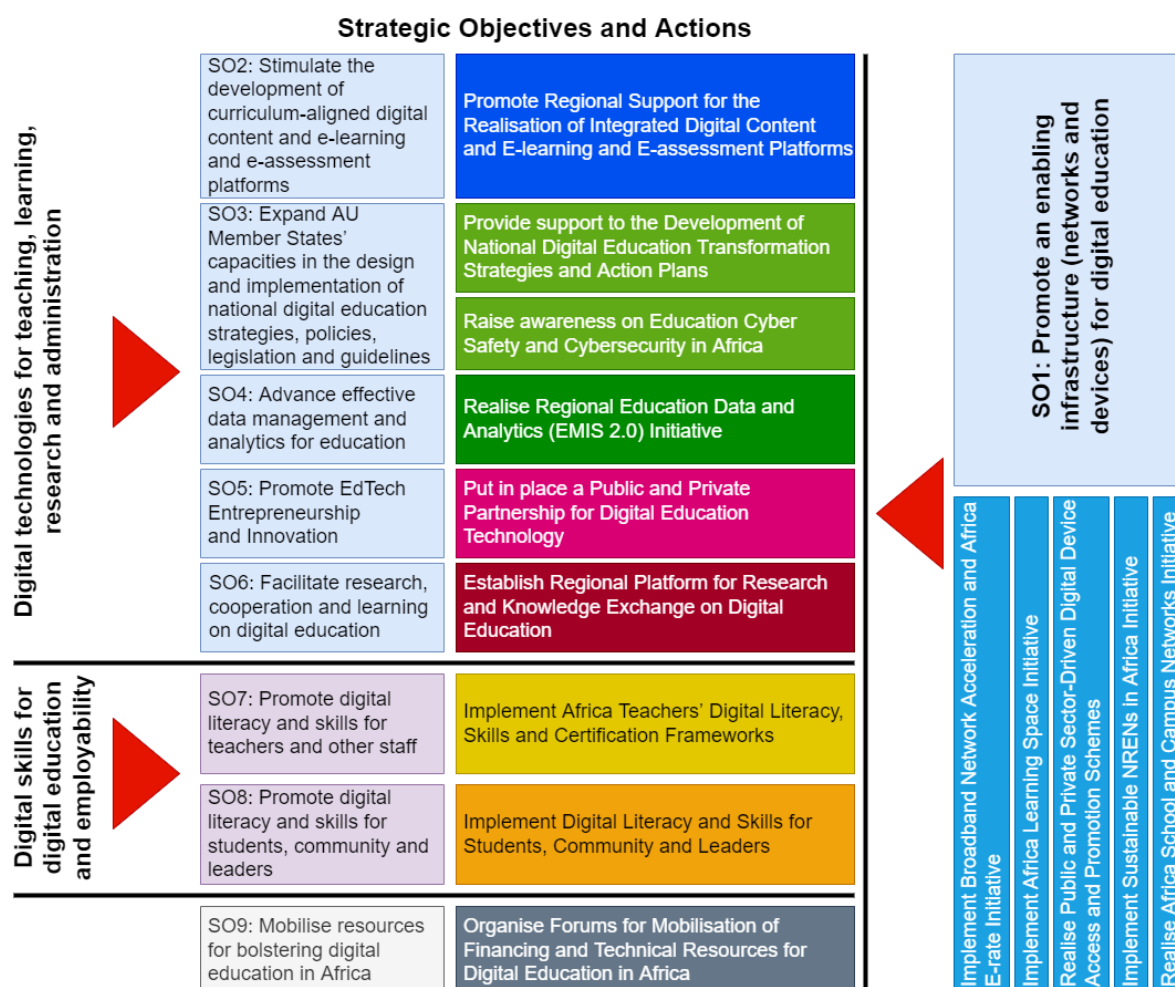
**Infrastructure development is the core strategic objective of digital education.** This Strategic Objective aims at accelerating network development, the reduction of the cost of Internet connectivity, improvement in the availability of devices for staff and students, tackling bottlenecks in school and campus networks design and implementation, accelerating the development of National Research and Education Networks (NRENs), including strengthening

existing ones, expanding research infrastructure and promoting digital education-friendly learning space (from well-designed classrooms to evidence-based construction and renovation of educational institutions for the digital age).

- i. The second strategic objective stimulates the development of an integrated curriculum-aligned digital content and secure and engaging platforms, respecting privacy and ethical standards across Africa. Core activities include enlisting teachers, curriculum designers, textbook publishers and others to develop and share digital content, developing standards, promoting national and regional networks for the exchange of open educational resources and launching initiatives that enable AU Member States to exchange best practices for developing or promoting digital learning and assessment solutions and content.
- ii. The third strategic objective focuses on supporting AU Member States' efforts to develop national digital education strategies that serve as a basis for investment in digital education. This strategic area also promotes regional efforts that facilitate online safety and cybersecurity policies, and other guidelines and legislation for digital education.
- iii. The fourth strategic area addresses AU Member States' education data and analytics capacity. This Strategic Objective seeks a transition from EMIS 1.0, which predominantly focused on aggregated data on students, teachers and institutions, to EMIS 2.0, which pays attention to individual-level learners, staff, and institutional data required to measure access and learning outcome, equity, relevance, and affordability of education. EMIS 2.0 will leverage advances in web-based platforms, experiences in other sectors like health (e.g., DHIS2), blended and hybrid learning data, unique identity, education data models/metadata, emerging technologies like artificial intelligence, etc. to establish functionally integrated and high-quality education data for decision-making at institutional (i.e., schools and campuses), regional and central levels.
- iv. The fifth strategic objective aims to advance AU', Regional Economic Communities (RECs)' and Member States' roles in stimulating the education technology enterprises (EdTech) sector and private sector innovations by promoting regional platforms for knowledge exchange and encouraging Member States to create conducive environments for vibrant EdTech start-up growth.
- v. The sixth strategic objective moves evidence-based digital education forward by establishing regional platforms and centres of excellence for the exchange of research insights on the digitalisation of education in the continent.
- vi. The seventh strategic objective facilitates regional competency and certification frameworks for teachers to ensure that digital literacy and skills become a core competency of every teacher on the continent and that teachers are certified and recognised for their digital literacy and skills.
- vii. The eighth strategic objective accelerates competency-based digital literacy and skills for students at all levels, from early childhood education, basic, TVET, higher education to formal and informal learning. It also considers education sector-driven ICT skilling and coding schemes for students and members of the community. Special emphasis will also be given to building the digital skills of education sector leaders.

Finally, the Strategy proposes AU' and RECs' driven regional forums for mobilising financial and technical resources for digital education in Africa.

The fourteen actions shown in the figure below represent the tasks that need to be undertaken to achieve the strategic objectives.



The Digital Education Strategy and Implementation Plan recognise the fact that to achieve changes at Member States levels, key supporting functions at the AU and RECs levels need to change. The successful implementation of the above building blocks of digital education requires prioritisation, coordination, resource mobilisation, knowledge mapping, management and sharing at AU, RECs and Member States levels. Therefore, the African Union will endeavour to equip itself, RECs and the Member States with the necessary human resources and technical expertise to promote an effective digital education ecosystem.

The lessons from successful digital education projects indicate financing, leadership, inclusion and partnerships are crucial. Digital education demands sustainable, multi-faceted efforts and financing by governments, development partners and the private sector, with attention to including rural and remote schools, gender equality and women's empowerment and inclusive approaches to meet the needs of children and adults with disabilities, and those on the move due to conflict and natural disasters. Leaders must provide the vision, resources, and accountability to ensure that digital education involving the eight building blocks is planned and implemented.

# 1. INTRODUCTION AND CONTEXT

## 1.1 Introduction

The AU Digital Education Strategy and Implementation Plan discussed in this document establish a holistic framework for an integrated and transformative regional plan for the digitalisation of the education sector for the period 2023-2028. The Strategy and Implementation Plan drew on an extensive situation analysis of education and digital technology application in Africa. The situation analysis reviewed infrastructure, policies, data management and use, digital literacy and skills, education technology enterprises (EdTech) innovation, and digital platforms for teaching and learning in all AU Member States.

The Strategy and Implementation Plan have also benefited from consultation with members of an ICT Task Force hosted by the African Union's Education, Science, Technology and Innovation (ESTI) Department and the Infrastructure and Energy Department (IED), which included members of the Continental Education Strategy for Africa's (CESA) ICT cluster hosted by the Global E-schools and Communities Initiative (GESCI). A team drawn from the African Union's Education Division and the Information Society Division provided ongoing substantive input and support to the development of the Strategy and Implementation Plan. Partners such as the European Union (EU) and the United Nations Children's Fund (UNICEF) have also provided invaluable inputs. The Policy and Regulatory Initiative for Digital Africa (PRIDA), funded by the European Union, provided technical assistance and analysis for the development of the Digital Education Strategy and Implementation Plan.

## 1.2 Education Sector Context

The context and the AU Member States' aspirations in expanding access, learning outcomes, relevance, and affordability define digital education's overall goal. In the last three decades, education across all levels, from early childhood to higher education, has expanded dramatically in the continent, with variation across countries and subregions. School participation has improved, especially with near-universal primary education at 98.9% by 2021, but this has not been repeated within subsequent levels. As a result, the average Gross Enrolment Ratio (GER) falls from 98.9% in primary education to 43.4% in secondary education and 9.4% in tertiary education compared to 101.6%, 76%, and 38.8% at the global level, respectively. There is also limited participation in early learning in the region, with slightly more than one-quarter (27%) of children between the ages of three and five attending early childhood education.<sup>1</sup>

The drop in secondary and tertiary intake means that most African youths above 13 years old are out of school. The upper secondary school-age children (above 16 years old) are more than

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<sup>1</sup> Borgen Magazine, Increasing Access to Early Childhood Education in Africa, <https://www.borgenmagazine.com/increasing-access-to-early-childhood-education-in-africa/>.

four times as likely to be out of school than children of primary school age.<sup>2</sup> This can be explained by many reasons, including dropouts, high population growth, poverty, poor access to education opportunities and non-compulsory education at upper secondary levels compared to lower secondary levels. The average completion rate by country is 65% at the primary education level, 41% at the lower secondary level, and only 23% at the upper secondary level in Africa.

The situation of learning outcomes is even grimmer in the continent. On average, only 22% of the students are achieving the minimum level of proficiency in mathematics. In comparison, 35% do so in reading when they complete primary education—again with a significant variation across countries and subregions.

Many factors contribute to the low learning outcome levels, but insufficient and unqualified teachers remain the underlying causes. The Sub-Saharan Africa average of trained primary teachers stands at 68% compared to the world average of 84% in 2019 (down from 85% in 2000—then there were more teachers for those going to schools).<sup>3</sup> Other teachers' related concerns include inadequate professional development opportunities and poor living and working conditions. On the students' side, access to learning materials and meals and lack of additional parental mentorship and support are considered as impediments to learning.

Technical Vocational Education and Training (TVET) is seen as a means of overcoming economic and social challenges, including poverty and unemployment, especially among youth and women, in and out of school. However, participation in TVET is still meagre in Africa. On average, the percentage of young people between 15 and 24 years old enrolled in vocational education is 3%.<sup>4</sup>

TVET access is subject to limited opportunities, and also hampered by low literacy rates. In 2018, about one in three people aged between 25 and 64, and one in five young people aged 15 and 24, were illiterate—this low participation in technical and vocational skills and illiteracy have compounded unemployment in the digital age. In 2019, 20.7% of young people aged 15 to 24 in Africa were not in education, employment and training (NEET). ILO's assessment shows that a far higher proportion of youth suffer from under-employment and lack of decent working conditions, with young girls being more disadvantaged than young men in accessing to work and experience.<sup>5</sup>

Beyond its limited capacity to absorb a growing number of secondary education graduates, higher education faces special challenges—including low quality, unpreparedness for the digital age, and poor linkage between education, research, innovation, and socio-economic development. Efforts have been made to rapidly set up new universities that are almost copies of the existing ones in several African countries in recent years, without paying attention to the different skills needed in the knowledge economy. Another tendency is to create new universities by simply upgrading polytechnics and technical colleges, with limited preparation

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2 Education in Africa <http://uis.unesco.org/en/topic/education-africa>

3 <https://data.worldbank.org/indicator/SE.PRM.TCAQ.ZS?locations=ZG-1W>

4 African Union and UNICEF, Transforming Education in Africa, An Evidence-Based Overview and Recommendations for Long term Improvements, <https://www.unicef.org/reports/transforming-education-africa>

5 International Labor Organization, Youth Employment in Africa, <https://www.ilo.org/africa/areas-of-work/youth-employment/lang--en/index.htm>

in the technology-enabled learning environment.<sup>6</sup> The mounting cost coupled with dwindling funding from the government and the high proportion of students in humanities and social sciences compared to science, technology, engineering, and medicine (STEM) compounded the problems of tertiary education.<sup>7</sup>

Equity of education remains a critical issue across all levels of education in Africa. Girls, children from the poorest backgrounds, children with disabilities and children on the move face more challenges in accessing and successfully completing education. Apart from unequal access between boys and girls, Water, Sanitation and Hygiene (WASH) facilities related challenges such as schools without toilets and latrines, where girls cannot cope with physiological periodic needs, and socio-cultural and economic factors prevent girls from continuing their education once they reach adolescence. It should be noted that the inequity situation varies among countries. For instance, in Benin and Mali, girls' transition to secondary school remains low because low-income families, particularly in rural areas that often require girls to do domestic work. On the other hand, more girls attend secondary education in Rwanda than boys, with a minimal marked difference in learning attainments. Yet, across all the countries, the inequality gap among children with disabilities remains high and needs to be addressed squarely.

**Box I: Digital Technologies Must Address the Barriers to Education in Africa**

Multiple barriers hinder access to and successful completion of education at different levels across African countries. Digital technologies must contribute to the national effort to alleviate the following challenges in education:

- High cost of access to education, especially for low-income families required to pay for uniforms, fees and learning resources,
- Limited availability of learning resources,
- Limited access to Water, Sanitation, and Hygiene (WASH) and other educational facilities.
- Disparities between boys and girls, poor and rich, rural and urban and limited access to education by children and adults with disabilities and those on the move for various reasons,
- High proportion of out of school children, youth and illiterate adults,
- Low school completion rate,
- Low learning outcomes,
- Limited number of qualified teachers,
- Limited use of innovative teaching and learning approaches,
- Limited access to and participation in technical, vocational education and training,
- Mismatch between the education system and the labour market, research in higher education and development challenges,
- Weak institutional frameworks and capacities to articulate, implement and monitor effective education programmes and interventions, and
- Unpreparedness of the education systems for digitally-enabled learning, teaching, assessment and research collaboration.

6 Goolam Mohamedbhai, Higher Education in Africa: Facing the Challenges in the 21st Century, <https://ejournals.bc.edu/index.php/ihe/article/download/8534/7668/>

7 African Union Commission, Continental Education Strategy for Africa 2016-2025, [https://au.int/sites/default/files/documents/29958-doc-cesa\\_-\\_english-v9.pdf](https://au.int/sites/default/files/documents/29958-doc-cesa_-_english-v9.pdf)



## 1.3 Transforming Education in Africa through Digital Technologies

Experience within the AU Member States like Kenya, Mauritius, Morocco, Tunisia, South Africa and worldwide shows that, when planned well and implemented sustainably, digital technologies can improve children's access, quality, engagement and learning in early childhood, primary and secondary education. Digital technologies provide more outlets for creativity and learning at the early childhood and primary education levels, yet, in Africa, access to digital education is deficient due to unpreparedness to integrate digital technologies in early learning, which includes, inter alia, limited platforms and services, high cost of equipment and teachers' lack of skills.

Access to digital technologies has improved at primary education levels across the continent through school connectivity (SchoolNet) programmes funded by different donors and governments, but the outcomes vary from one country to another. For example, the Kenyan Digischool project provided devices to 21,637 (99.6%) primary schools and trained 331,000 teachers in digital literacy and skills and curriculum-aligned content between 2017 and 2021.<sup>8</sup> Assessment of the Digischool shows that teachers were able to benefit from using digital technologies for preparation and record-keeping<sup>9</sup> and students from accessing diverse learning content and improved digital literacy.<sup>10</sup> Overall, the full integration of ICTs in the classroom remained uneven. Across the continent, teachers and students' unequal access to digital technologies, limited infrastructure, including electricity, limited professional training for teachers to integrate digital tools into learning, assessment and teaching, and high cost of devices and connectivity remain challenges.

### Box II: Tunisian Experience in Digital Education

Tunisia is one of the top African countries that has benefited from consistent ICT introduction in education programmes dating back to 1998. Initial ad hoc ICT introduction was followed by a systematic integration of digital tools in secondary and tertiary education, development of skills and creation of online services like that announcing the national examination results. Tunisia adopted its first ICT in education strategy in 2010 that focused on developing connectivity, a data centre, an education cloud, learning content (<http://www.ecolenumerique.tn/>, <http://www.edutic.edunet.tn/mesressources>), and services (<http://www.ent.cnte.tn> and <http://www.eduserv.edunet.tn/>).

The Government has also emphasised competency-based digital literacy and skills with the introduction of certification in digital content production, ICT integration in education, and management of educational institutions and computer science (2ci). The Virtual University of Tunis that was established in 2002 is one of the most advanced institutions in integration of the

8 Lilian Kimeto, the Impact of DLP in Teaching and Learning in Kenya, <https://icta.go.ke/digischool/2020/04/29/the-impact-of-dlp-in-teaching-and-learning-in-kenya/>

9 Kerkhoff, Shea and Timothy Makubuya, professional Development on Digital Literacy and Transformative Teaching in a Low-Income Country: A Case Study of Rural Kenya, <https://ila.onlinelibrary.wiley.com/doi/full/10.1002/rrq.392?af=R>

10 Lessons Learnt from Digischool, see UNICEF and Africa Union, Transforming Education in Africa, An Evidence-based Overview and Recommendations for Longterm Improvements, <https://www.unicef.org/media/106686/file/Transforming%20Education%20in%20Africa.pdf>

latest tools for remote delivery of higher education.

In 2015, building on its experience, the Ministry of Education launched a "Digital solution for all" program to improve the quality of education of over two million students and 150,000 primary and secondary school teachers. The objective was to promote the integration of digital tools in the learning process, extend access to digital resources to all students, and exploit digital technologies in the service of academic success, innovation and citizenship. These efforts had positive impact on access to online learning resources during the COVID-19 pandemic. Drawing on the lessons during the Pandemic, the Ministry of Education is striving to bridge the access gap to digital infrastructure (especially devices for students) and improve students' and teachers' digital literacy and skills to leverage ICT for teaching and learning further.

Sources: <https://docplayer.fr/7557809-La-strategie-nationale-de-l-integration-des-tic-dans-l-education-en-tunisie.html>, <https://blogs.worldbank.org/fr/arabvoices/tunisia-technology-support-school-improvement>, Nejah, Aissaoui, COVID-19, enseignement à distance et fracture numérique : Quelles mesures prendre pour la Tunisie?, [https://www.researchgate.net/publication/357281341\\_COVID-19\\_enseignement\\_a\\_distance\\_et\\_fracture\\_numerique\\_Quelles\\_mesures\\_prendre\\_pour\\_la\\_Tunisie\\_par\\_Najeh\\_Aissaoui](https://www.researchgate.net/publication/357281341_COVID-19_enseignement_a_distance_et_fracture_numerique_Quelles_mesures_prendre_pour_la_Tunisie_par_Najeh_Aissaoui)

Secondary schools fare better than primary schools in access to digital tools thanks to the "one lab per school"<sup>11</sup> and other initiatives launched to introduce ICTs at this level. Many countries have continued paying attention to ICT in secondary education because of its importance for developing foundational digital literacy and skills. For example, the Tanzania government aims to install computer laboratories and ICT facilities in 1,500 new public secondary schools in the next three years.<sup>12</sup> Again, the progress of digital education at secondary levels varies widely across schools and among countries due to limited access to devices, electricity and the Internet, and the incomplete understanding of policymakers about what technology can and cannot achieve.<sup>13</sup> The extent to which digital technologies are used for teaching and learning and for enhancing specialised ICT as well as coding skills has been hampered by the absence of a competency framework for students and teachers, the lack of integration of digital literacy and skills into the curriculum, and the limited number of skilled teachers to deliver ICT courses.

TVET institutions are expected to offer digital literacy and skills training for the youth and, at the same time, leverage ICT tools for teaching and learning in other fields such as woodwork, electrical work, metalwork, leather-craft, garment manufacturing, culinary, photojournalism, etc. Tools such as simulations, 3D immersive virtual reality, open educational resources, videos, collaboration platforms and mobile phones can make TVET training much more engaging than conventional delivery modes. Yet, African TVET institutions remain largely untouched by digital technologies, which are still viewed with scepticism by most trainers and mentors. Other limiting factors include the lack of a single entity responsible for digital TVET and skills policy, gender disparity in the programmes that leverage digital technologies for employability and lack of basic infrastructures, such as electricity, broadband and equipment. In addition, the digital competence of teachers and trainers is a core limiting factor for TVETs' integration of digital technologies in the teaching and learning process.<sup>14</sup>

11 <https://panafricanvisions.com/2016/08/zimbabwes-ict-lab-per-school-project-enhances-digital-technology/>

12 <https://africa.cgtn.com/2021/12/17/tanzania-to-install-computer-labs-in-schools-to-spur-digital-information/>

13 Mastercard Foundation, ICT In Secondary Education in Africa – Policies, Practices, Trends and Recommendations, <https://mastercardfdn.org/wp-content/uploads/2019/11/ICT-in-Secondary-Education.pdf>

14 International Labour Organisation, The Digitalisation of TVETs and Skill Systems, <https://www.ilo.org/wcmsp5/groups/public/>



African higher education is embracing digital technologies gradually, but the innovation lags progress in other regions such as Latin America and Asia. Digital technologies provide opportunities for addressing the challenges facing higher education—accessibility issues, falling quality, the mismatch between education and employability, and the disconnect between research and development challenges. Experience of some online universities like the Virtual University of Tunis<sup>15</sup> and the Virtual University of Senegal<sup>16</sup> indicate that digital technologies allow out of school youth's access to higher education. The Virtual University of Senegal, for example, comprises a headquarters in Dakar, and five additional Open Virtual Spaces (ENO) scattered across the country to allow men and women in the Dakar suburbs, Saint Louis, Thiès, Kaolack and Ziguinchor access to quality online higher education.

Across the region, the growing demand for higher education necessitates alternative and innovative form of learning such as digital technology-enabled distance and open/virtual learning that leverage the latest Massive Open Online Courses (MOOCs) platforms. Still, the continent's progress in adopting these latest virtual learning platforms is low. Further, the continent has limited digital infrastructure such as High-Performance Computers (HPC) that can be used by researchers to perform studies in different areas of fundamental and applied sciences.

A situation analysis of the development of National Research and Education Networks (NRENs) indicates that although forty countries established NRENs, a few countries like Algeria, Egypt, Kenya, Morocco, South Africa and Tunisia have built advanced connectivity to facilitate teaching, learning and research collaboration nationally and internationally. Beyond connecting educational institutions, NRENs play critical roles in promoting open science- facilitating collaboration, enabling research communities and sharing data on global challenges like climate change and epidemics.

In sum, the assessment of digital technology use from early childhood learning to higher education and lifelong learning in Africa indicates that the imminent digitalisation requires multi-faceted actions—programs that deliver digital infrastructure for teaching, learning and assessment, the development of digital learning materials and their availability through integrated and easy to use online learning platforms, improvement in data and analytics, EdTech private sector development, innovation and entrepreneurship and government commitments and capacities to articulate, implement and enforce policies, legislations and strategies. These elements are critical for all AU Member States, regardless of their state of digital maturity.

Equity of access to digital education remains another critical issue across all levels of education and in all Member States. The equitable use of digital technologies by girls, women, marginalised people in rural areas and those on the move and students with disabilities, requires concerted and multi-faceted regional efforts. Increasing the number of female educators and those with disabilities that use digital solutions can play a crucial role in encouraging more girls to participate in digital education. At the same time, all educators should tackle stereotypes and actively promote the inclusion of women and girls and those with

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[--ed emp/---emp ent/documents/publication/wcms\\_752213.pdf](#)

15 <https://www.uvt.rnu.tn/en/>

16 <https://www.uvs.sn/>

disabilities through encouragement and promotion of the adoption of assistive technologies.

Efforts that bring those working on digital equity issues together are also critical, as demonstrated by the European Network for Technology Enhanced Learning in an Inclusive Society (ENTELIS).<sup>17</sup> The ENTELIS experience shows that such networks promote resources sharing and best practice exchange and serve as good platforms for capacity building.

Successful programmes also indicate that digital education programmes should respond to the needs of learners, teachers and decision-makers.

**Box III: Requirements of Different Stakeholders in Education**

**Learners:**

- Equitable access to devices, networks and affordable quality Internet connectivity,
- Digitally-enabled education informed by innovative pedagogies,
- Curricula that facilitate digital competencies and skills acquisition to meet 21st Century and industry requirements,
- Well-defined and recognised basic digital competencies and advanced digital skills,
- More autonomy in the learning process based on their circumstances, and
- Access to flexible and adaptive learning.

**Teachers:**

- Equitable access to devices, connectivity, content and applications to support teaching, learning and assessment,
- Digital literacy and skills informed by competency framework,
- Ongoing support and guiding policies,
- Easier access to high-quality and engaging digital education resources.

**Decision Makers:**

- Capacities to articulate, implement and enforce policies, strategies and legislation for digital education,
- Digital infrastructure and resources fair use and safe access,
- Data and analytics for better monitoring and improved decision-making, and
- Strong cooperation with the private sector whilst also addressing the potential of vendor lock-in and misuse of data and partnership with development partners.

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17\_ <https://www.entelis.net/resources/experiences/>

## 2. REGIONAL POLICY CONTEXT FOR DIGITAL EDUCATION

This Digital Education Strategy and Implementation Plan align with the African Union's efforts to build skilled workforces for the knowledge economy. The AU recognises that digitalisation is a tool for addressing the challenges in the education sector and a driving force for innovation. The AU Agenda 2063 states that “well-educated and skilled citizens, underpinned by science, technology and innovation for a knowledge society is the norm and no child misses school due to poverty or any form of discrimination.”<sup>18</sup> Through Agenda 2063, African countries have committed themselves to fully develop human capital through universal access to early childhood development and basic education and sustained investments in higher education, science, technology, research and innovation. Digital education is one of the gears to attain this commitment.

The Digital Strategy and Implementation Plan themes are crafted to facilitate the achievement of the AU' Continental Education Strategy for Africa' (CESA 16-25) strategic objectives, namely—revitalising the teaching profession, building education infrastructure, improving learning and completion rates, accelerating science and mathematics education, expanding Technical and Vocation Education (TVET) and higher education opportunities.<sup>19</sup> The African Union's Continental Strategy for Technical and Vocational Education and Training<sup>20</sup> further emphasises the importance of ensuring the relevance of training to respond to the demand for social and economic development, of which digitalisation will be a crucial component. The TVET Strategy places a premium on fostering employability, sustainable livelihoods and responsible citizenship. Furthermore, thrust is placed on building capacity to create and innovate, anchored within the frame of entrepreneurship, which cannot be achieved without leveraging digital technologies.

Digital education is also underpinned by the Digital Transformation Strategy for Africa (DTSfA)<sup>21</sup> that was endorsed at the 36<sup>th</sup> Ordinary Session of the African Union Executive Council in 2020, in Addis Ababa, Ethiopia. The DTSfA aims to harness digital technologies and innovation to transform Africa's societies and economies, promote Africa's integration, generate inclusive economic growth, stimulate job creation, and secure the benefits of the digital revolution for socio-economic development. The Strategy comprises foundation pillars (Enabling Environment, Policy and Regulation, Digital Infrastructure, Digital Literacy and Skills, and Human Capacity, Digital Innovation and Entrepreneurship), critical sectors (Digital Industry, Digital Trade, and Financial Services, Digital Government, Digital Education, Digital Health, Digital Agriculture) to drive the digital transformation and cross-cutting themes (Digital Content and Applications, Digital ID, Emerging Technologies, Cybersecurity, Privacy, and Personal Data

18 African Union, Agenda 2063, The Africa We Want, [https://au.int/sites/default/files/documents/36204-doc-agenda2063\\_popular\\_version\\_en.pdf](https://au.int/sites/default/files/documents/36204-doc-agenda2063_popular_version_en.pdf)

19 African Union, Continental Education Strategy for Africa, <https://edu-au.org/strategies/185-cesa16-25>

20 African Union, Continental Strategy for TVET, <https://au.int/en/documents/20181022/continental-strategy-technical-and-vocational-educational-and-training-tvet>

21 African Union, Digital Transformation Strategy, <https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>

Protection, Research and Development) to support the digital ecosystem. It includes policy recommendations and actions under the foundational pillars, critical sectors, and cross-cutting themes.

DTSfA emphasises the importance of addressing critical bottlenecks in adopting and scaling up the digitalisation of Africa's education systems, including connectivity, content/pedagogy, cost of data, access to devices and teaching and ICT management and maintenance capacity. In addition, the Strategy emphasises the need to explore the application of no-tech, low-tech and high-tech methods to respond to requirements in different contexts and offer practical steps and guidance for the digitalisation of education in AU Member States.

In response to the COVID-19 pandemic, the African Union's Specialized Technical Committee (STC) endorsed a **D**igital connectivity, **O**nline and offline learning, **T**eachers as facilitators and motivators of learning, **S**afety online and in schools, and **S**kills focused learning (DOTSS) framework<sup>22</sup> that serves as a foundation for education interventions during and beyond the pandemic. The DOTSS framework elevates the role of the teachers in advancing the uptake of digital technologies and the importance of online child protection.

Furthermore, the African Union has adopted a digital security strategy to protect African citizens, governments and businesses from breaches of cybersecurity and cybercrime as information systems and digital infrastructures become more vulnerable amid the growing digital economy. The AU also adopted an Interoperability Framework for Digital ID that defines common requirements, minimum standards, and governance mechanisms for Africa in alignment with the different national legal frameworks.<sup>23</sup> The Interoperability Framework provides a common standard to digitally represent proof of identity issued by trusted sources from the AU Member States to ensure data systems interoperability across the region. As a result, individuals who hold an ID from a national system will be able to obtain an interoperable, digital credential for legal identity (IDC-ID) that will take the form of a verifiable claim.

The AU cybersecurity strategy and digital ID interoperability framework establish the foundation for safe digital education and interoperability between data. For example, the experience of the European Student Card and Europass Digital Credential<sup>24</sup> indicates that a regional Digital ID framework offers opportunities to record and manage skills and qualifications for better job opportunities and ensures easy exchange of student data that facilitate the transfer of credit between institutions within a region.

The African Union has also launched an Agenda 2063 flagship project – the Pan African Virtual and E-University (PAVEU) that leveraged digital technologies to bring education to large number of students and professionals and professionals in multiple sites simultaneously- anywhere, anytime. PAVU, among others, aims to increase access to quality tertiary and continuing education and raise pedagogical and research capacity of African tertiary education institutions.<sup>25</sup>

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22 African Union, Policy Guidelines for Digitising Teaching and Learning in Africa, [https://au.int/sites/default/files/documents/38788-doc-policy\\_guidelines\\_final.pdf](https://au.int/sites/default/files/documents/38788-doc-policy_guidelines_final.pdf)

23 African Union, Draft Interoperability Framework for Digital ID, Unpublished

24 <https://europa.eu/europass/en/learn-europe>

25 <https://pau-au.africa/institutes/virtual-and-e-university>

Digital education is also an important focus area of the Regional Economic Communities (RECs) ICT policies, as summarised in Table 1. Digital education specifically aligns with initiatives for equipping the workforce in Central Africa, facilitating school-work transition in Eastern Africa, modernisation of education sector in North Africa, improving the quality of education in Southern Africa and investing in human capital in alignment with future market needs in West Africa. RECs will play significant roles in promoting digital transformation in education, particularly in supporting countries' efforts to articulate and implement digital education strategies, harmonising digital competencies and skills frameworks, and promoting students and employee mobility.

**Table 1: Digital Education's Alignment with REC's Digital Policy Focus Areas**

Region	Digital Policy Focus Areas
<b>Central Africa</b>	<ul style="list-style-type: none"> <li>• Coordinate investment in digital infrastructure regionally to expand coverage and ensure inclusive and reliable access.</li> <li>• <b>Equip the workforce with adequate skills to facilitate the school-to-work transition and reduce the skills mismatch.</b></li> <li>• Leverage digital technologies to promote entrepreneurship and foster the digital transformation of regional value chains.</li> <li>• Implement, monitor and evaluate digital strategies at the regional and national levels.</li> </ul>
<b>Eastern Africa</b>	<ul style="list-style-type: none"> <li>• <b>Facilitate the school-to-work transition, notably through digital literacy and technical and vocational education and training (TVET) programmes and monitor technological developments to anticipate future skills requirements.</b></li> <li>• Nurture digital entrepreneurship and innovation by adopting the regulatory environment, and promoting technology parks, notably through more accessible financing.</li> <li>• Strengthen regional cooperation on digitalisation, and mobilise public and private resources for regional infrastructure.</li> <li>• Set up a single digital market by promoting seamless connectivity, harmonising regulations and facilitating the interoperability of cross-border payments.</li> </ul>
<b>Northern Africa</b>	<ul style="list-style-type: none"> <li>• Support the development of financial technology by loosening regulatory constraints and experimenting with new regulations (e.g., sandboxes).</li> <li>• <b>Modernise education and training systems by monitoring and evaluating digital literacy and programmes for science, technology, engineering and mathematics, and promote lifelong learning and reskilling of the workforce.</b></li> <li>• Encourage digital entrepreneurship by fostering innovation through public-private partnerships and improving governance in the region.</li> </ul>
<b>Southern Africa</b>	<ul style="list-style-type: none"> <li>• Reduce the digital divide by developing reliable and affordable digital infrastructure beyond urban centres.</li> <li>• <b>Improve the quality of education and promote lifelong learning to meet future skills demands.</b></li> <li>• Harmonise existing digital initiatives at the national and regional levels, and accelerate their implementation, targeting the digital transformation of strategic value chains.</li> </ul>

Region	Digital Policy Focus Areas
<b>Western Africa</b>	<ul style="list-style-type: none"> <li>• Strengthen government support to technology parks and start-up incubators, and monitor progress.</li> <li>• Implement supportive regulatory frameworks to develop Fintech, foster financial inclusion and diversify sources of financing for private sector development.</li> <li>• Support entrepreneurs and SMEs using digital technologies, especially agriculture, to strengthen their integration into regional and global value chains.</li> <li>• <b>Invest in human capital to align skills with future market needs, and promote TVET through strategic partnerships with the private sector.</b></li> </ul>

*Source: UNECA Presentation<sup>26</sup> at UNESCWA event*

The commitment of the AU and its Member States was further amplified by the impact that the COVID-19 pandemic had on teaching, learning and administration of education. The pandemic brought digital technologies to the forefront, urging for the promotion remote learning during the school closures. COVID-19 highlighted the importance of digital technology-enabled education reforms, the need to design and implement integrated learning platforms and the significance of professional development for teachers and digitally skilled students.

26 [https://www.unescwa.org/sites/default/files/event/materials/02-UNECA\\_Jean-Paul\\_Adam\\_%20African\\_Digital\\_Transformation\\_Strategy\\_0.pdf](https://www.unescwa.org/sites/default/files/event/materials/02-UNECA_Jean-Paul_Adam_%20African_Digital_Transformation_Strategy_0.pdf)

### 3. LESSONS FROM COVID-19 REMOTE EDUCATION INTERVENTIONS IN AFRICA

The COVID-19 pandemic has had a detrimental impact on Africa's already fragile education systems. Governments across the region closed educational institutions early at the onset of the pandemic. The closures impacted over 250 million students and lasted longer than those in other regions.<sup>27</sup> Most countries introduced digital technologies and intensified non-digital options to mitigate learning losses during the closure of schools and campuses, but the efforts were far from successful.

It was clear from the experience that access to low-tech tools like TVs and radios are crucial for remote learning until advanced digital solutions become available for students and teachers. Offline learning platforms like Kolibri<sup>28</sup> that make learning resources available for the unconnected can also play a role.

The COVID-19 experience also showed that online learning using the Internet, computers, tablets, and mobile phones creates an environment that emulates classroom-like interactions, providing a superior learning experience than TVs and radio. Online learning has been the preferred solution for continuing education during the pandemic, especially for higher education, due to the richness of the content and potential for continued interaction between faculty and students.

The pandemic has also revealed that the digital divide exacerbates the learning divide further. The pre-existing digital divide, namely the limited ICT penetration, especially user devices and access to the Internet impeded the use of digital technologies for continued learning during the pandemic. The continuity of education during the closure varied between students in urban and rural areas, wealthy and poor households, boys and girls, digitally equipped private schools and colleges, and those with limited or no access to affordable and high-speed connectivity and electricity grid.

Students faced a series of obstacles during the shutdown, including a lack of access to devices and connectivity, an unsuitable home learning environment, and a lack of access to appropriate learning materials. The main bottleneck for teachers was lack of appropriate training to design and manage learning content for the online environment.<sup>29</sup> Students with disabilities were marginalised due to a lack of appropriate assistive tools and apps at home and on the learning platforms. In addition, girls had more culturally-induced pressures, such as tending to other family members or being forced into early marriage, thus, further limiting their access to remote education. Furthermore, wherever digital education is practised, exposure to the online environment has increased compounding cyber safety issues. This included risks of exposure

27 UNICEF, COVID-19 and School Closure, One Year of Education Disruption, <https://data.unicef.org/wp-content/uploads/2021/03/COVID19-and-school-closures.pdf>

28 Kolibri is an adaptable solution for facilitating learning in areas with no Internet connection. It includes a curricular tool, a library of open educational resources, and a toolkit to support training and implementation in formal, informal and non-formal learning environments. See - <https://learningequality.org/kolibri/>

29 E-Learning Africa, The Effect of COVID-19 on education in Africa and its implications for the use of technology, A Survey of the Experience and Opinions of Educators and Technology Specialists



to content harming children's rights, misinformation, disinformation, online harassment, cyberbullying from peers, and identity theft-related crimes. Finally, the inadequate readiness of teachers and decision-makers has played a part, highlighting the importance of teachers' digital competence and policymakers' awareness of what technology can and cannot do.

On the positive side, the pandemic elevated the role of digital technologies and accelerated the adoption of digital learning tools and innovation by students and teachers. EdTech enterprises like Eneza Education,<sup>30</sup> Ubongo,<sup>31</sup> and M-Shule<sup>32</sup> stepped up their offerings during the pandemic. There was also increased discussion of zero-rating plans by commercial providers to allow students to access education content for free without having to incur charges for data bundles, something that violates the principles of net neutrality (e.g., Internet traffic should have the same priority and cost).<sup>33</sup> NRENs have also worked with commercial providers to make eduroam (education roaming)<sup>34</sup> accessible off-campus to help higher education students and staff access learning and research resources remotely from their homes.

The pandemic highlighted the importance of organising curricula-aligned digital content, providing access to digital devices for students and teachers and accelerating affordable connectivity. It also showed the need for nurturing local digital enterprises and innovation (EdTech). Further, the pandemic showed the importance of digital education equity, especially for reaching schools and children in rural areas and those left behind—whether because of poverty, disability, race, ethnicity, gender, or displacement.

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30 <https://enezaeducation.com/>

31 <https://www.ubongo.org/>

32 <https://m-shule.com/>

33 <https://www.dailydot.com/debug/zero-rating/>

34 <https://eduroam.org/>



## 4. BUILDING BLOCKS FOR DIGITAL EDUCATION IN AFRICA

### 4.1 Building Blocks

Digital technologies are reshaping education around the globe, but the way they are introduced and implemented varies considerably across countries and educational institutions. Digitalisation impacts education and employability. The future workplace requires people who have received the highest quality education and excellent digital literacy and skills regardless of location, background or ability. This means that education in Africa needs a future-ready framework for visioning, planning and implementation of technology-enabled learning, teaching, research, administration, and digital literacy and skills development.

Based on this logic:

- i. First, there is a need to establish the “digital foundations” of education (e.g. infrastructure, software, content, platforms, administrative and management systems and innovations, research and learning, etc.) to leverage digital technologies for inclusive, equitable and high-quality teaching and learning, for effective assessments, collaborative research and better education systems administration, management and decision-making.
- ii. Second, there is a need to equip all educators and students with digital competencies (literacy, knowledge, skills and attitudes) to teach, learn, work and thrive in the digital society and economy. Students need basic digital competencies for digital citizenship (throughout basic education) and progressively advanced and specialised digital skills for employment.
- iii. Third, there is a need for acceleration of the capacities of AU member states in building the requisite networks for digital education and ensuring devices are available for students and staff.

The other building blocks of the digital education are (shown in green in Figure 1). These include:

- i. Digital content and platforms, including locally developed curriculum-aligned online learning content, freely available Open Educational Resources (OER), public or private driven learning content and platforms and a host of other EdTech solutions like virtual reality, interactive blackboard, assessment applications, etc. that enable creation, management and sharing of content and facilitate blended learning. Educational platforms should be secure and safe (ensuring ethical AI and data usage, and ensuring children’s rights) and provide access to high quality, learner-centred / interactive, curriculum-aligned digital content.
- ii. Education data and analytics for decision-making at national, sub-national and institutional (schools, TVETs, colleges, universities and in classrooms) levels.
- iii. National, regional and institutional capabilities to articulate and implement digital education strategies, develop policies, laws and guidelines and enforce them.

- iv. Developing an enabling environment for EdTech sector development.
- v. Research, monitoring and learning about how digital education can be implemented efficiently and effectively, and the impacting on inclusion, equity, quality education outcomes and employment/entrepreneurship.
- vi. Digital literacy and skills for educators, and
- vii. Digital literacy and skills for students, community and leaders.

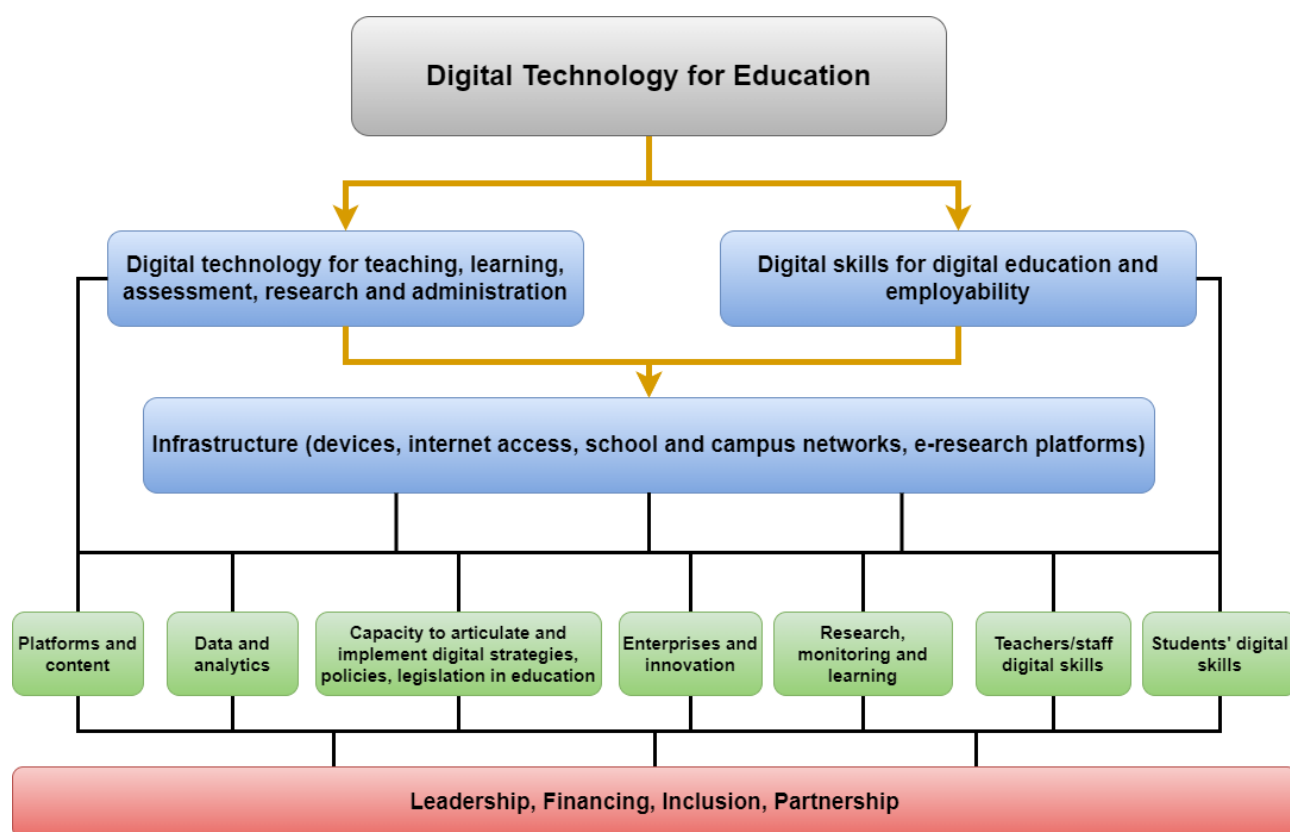


Figure 1: AU Framework for Digital Education

Digital infrastructure, including networks and devices and e-research infrastructure such as High-Performance Computing (HPC), are the critical cross-cutting requirement for the successful digitalisation of education in Africa. Access to computing devices and affordable high-speed connectivity at the campus or school levels with regional and international reach are crucial building blocks for implementing learning platforms, data ecosystem and building digital literacy and skills.

Further, the experiences of successful digital education programmes at the national level, such as Digischool<sup>35</sup> for connecting primary schools in Kenya and the AfricaConnect<sup>36</sup> project that promoted higher education connectivity across Africa suggest the importance of four other enablers—Financing, Leadership, Inclusion, Partnerships (FLIP, shown in red in Figure 1).

Digital education should involve long term, multi-faceted efforts by government, development partners and the private sector, with the attention to the **inclusion** of rural and remote schools,

35 <https://icta.go.ke/digischool/>

36 <https://africaconnect3.net/>

gender equality and women's empowerment and inclusive approaches to meet the needs of children and adults with disabilities, and those on the move due to conflict and natural disasters.

**Leaders** must provide the vision, resources, and accountability to ensure that ICT-led education involving the eight building blocks is planned and implemented.

**Funding** of digital education is critical because integrating digital solutions in teaching, learning, assessment, and administration and building digital skills require devices, connectivity, learning platforms and adaptable campus networks that in turn demand substantial financial resources. However, it should also be noted that effective planning and implementation of digital technology initiatives can result in significant cost savings in the long run despite the high upfront costs. Thus, efforts are needed to secure digital education financing from the public budget, universal access funds, private investment or donors grants to cover the upfront upgrade and maintenance costs.

**Box IV: The Implications of Financing, Leadership, Inclusion and Partnerships for the success of Digischool in Kenya and AfricaConnect**

**Digischool**

Digischool is a Digital Literacy Programme (DLP) of the Government of Kenya to promote digital education in all primary schools. The programme involves i) the provision of digital devices preloaded with interactive digital content covering different subjects for both learners and teachers, ii) capacity development for teachers and implementers, iii) provision of broadband connectivity and access to devices, iv) the provision of content for digital learning and v) the establishment of local assembly for digital devices and related accessories. By 2021, the Digischool project provided devices and electricity via grid and solar to 99% of the primary schools in the country. In addition, over 331,000 teachers have been trained to integrate digital technologies in teaching and learning.

- **Funding**—Digischool's funding was provided by the government of Kenya using different financing mechanisms - from the national budget, via multilateral and bilateral donors funding, through development financing by Multilateral Development Banks and private sector investment. In 2020, the government earmarked spending of \$140 million to upgrade the digital education environment of 1000 schools.
- **Leadership**—The President of Kenya launched the Digischool in 2016. Further leadership was provided by the Minister of Information and Communication Technology and a dedicated team at the ICT Authority.
- **Inclusion**—Digischool covered all schools, including those in remote areas. Close to 4000 schools that were not on the grid were provided with solar power. Emphasis was also made on gender equity and ensuring children with disabilities have access to devices, content and connectivity.
- **Partnerships**—Public and-private partnership was the main driver of Digischool. Many external and internal partners were involved, including the Chinese Government, Huawei and Telkom Kenya. The Kenyan Education Network (KENET) has also partnered with Digischool to connect schools with its experience and resources.

### AfricaConnect

The European Union funded the AfricaConnect project to connect universities in the continent to each other and the rest of the world using a National Research and Education Networks (NREN) model. The first phase of AfricaConnect ran between 2011 and 2015, focusing on research and education networks development and connectivity in eastern and southern Africa. AfricaConnect2, which ran between 2015 and 2019, extended NREN development and connectivity to more eastern African countries and western and central Africa. Previously covered under the EUMEDConnect programme, Northern Africa also participated in AfricaConnect 2. The third phase of AfricaConnect, which commenced in 2020, builds on its predecessors and focuses on expanding connectivity across Africa's teaching, learning and research communities.

- **Funding**—AfricaConnect was co-funded by the European Union and National Research and Education Networks. NRENs contribute around 20% of the project's cost. The EU provided Euro 61.8 million in three phases (first phase Euro 11.8 million, second phase Euro 20 million and third phase Euro 30 million).
- **Leadership**—AfricaConnect is led by Regional Research and Education Networks (RRENs) namely the UbuntuNet Alliance, the West African Research and Education Network (WACREN), and the Arab States Research and Education Network (ASREN) in Africa and GEANT Association and EU in Europe.
- **Inclusion**—AfricaConnect covers all countries. The project has also endeavoured to promote technical training of women and the participation of women in e-science.
- **Partnerships**—Partnership between NRENs, RRENs and other global research and education networks like GEANT in Europe, Red CLARA in Latin America and Internet 2 in North America was instrumental in the success of the AfricaConnect project. The Network Start-up Resource Centre (NSRC) of the University of Oregon was a crucial partner in delivering technical training to NREN technical personnel in Africa. The World Bank has also provided resources for NRENs in selected countries to enable them to participate in the AfricaConnect project.

The experiences above show that digital education impacts students, teachers, staff, the private sector and a wide range of institutions; thus, partnerships are key to achieving progress in harnessing ICTs for teaching, learning, assessment, planning and administration at national and regional levels. Collaboration among individuals, institutions and ministries will be key to success at the national level. *Success is particularly achieved when the Ministries of Education and the Ministries responsible for Information and Communication Technology work in tandem.* The Ministry of Education should lead on the application and use of digital technologies. The Ministry of Communication plays a leadership role in promoting affordable connectivity and access to devices (e.g., through universal access fund or innovative public and private sector partnership models that involve telecom companies). Countries that have seen success in digital education were able to forge collaboration among decision-makers, regulators, education institution leaders, the national body responsible for quality and standards, NRENs and the private sector.

## 4.2 Situation Analysis of Digital Education Programmes in Africa, Summary of the Findings

A situation analysis of the digital technology environment conducted in the AU Member States shows that most African countries have not achieved the desired maturity within the eight building blocks of digital education discussed above. Figure 2 shows that Kenya, Mauritius, Morocco, Seychelles and Tunisia have made considerable progress in the overall digitalisation of their education system, stepping up initiatives in data and analytics, EdTech development, ensuring access to devices and the Internet and building the requisite digital literacy and skills. On the other hand, Burundi, Central African Republic, Eritrea, Somalia, Saharawi Arab Republic, and South Sudan have limited digital education activity.



Figure 2: Digital Education Maturity of AU Member States

Source: Situation Analysis Report

The assessment shows that countries with higher network readiness are those leading in digital education in the continent. A few countries have also articulated digital education strategies that guided their adoption of ICTs in teaching, learning and assessment. Most countries that did not articulate national digital education strategies could not develop competency-driven digital literacy skills for teachers and students. In addition, they lacked programmes that spurred local entrepreneurship and innovation.

Table 2 summarises the enablers and inhibitors of digital education identified via the situation analysis to be dealt with through the Digital Education Strategy and Implementation Plan.

Table 2: Attributes, Enablers and Inhibitors of Digital Education Programs in AU Member States

Attribute	Enablers	Inhibitors
<p><b>Infrastructure</b> (devices and connectivity, NREN development)</p>	<ul style="list-style-type: none"> <li>• The second wave of submarine cable investment is underway, which is expected to bring more bandwidth to the education sector</li> <li>• Increasing private sector investment in regional and national backbone networks</li> </ul>	<ul style="list-style-type: none"> <li>• Limited access to international connection, inadequate regional and national backbone and last-mile link to schools, colleges and universities</li> <li>• Insufficient bandwidth per capita—100 Kbps per user is a requirement, and most countries do not have sufficient bandwidth per capita</li> <li>• High cost of bandwidth due to differences in legal and commercial conditions, poorly enforced policy and regulatory environments, limited competition, and geographic and trans-border access limitations</li> <li>• Limited development of data infrastructure (IXP, data centres)</li> <li>• Inadequate access to electricity</li> <li>• Low level of NREN development</li> <li>• Low-quality schools, TVETs, college and university campus networks</li> <li>• Inadequate devices access schemes for students and teachers</li> </ul>
<p><b>Digital education platforms and content</b></p>	<ul style="list-style-type: none"> <li>• Long-standing experience in remote education via Interactive radio Instruction and TV</li> <li>• Digital platform innovations such as "Kolibri" that can support content for environments without Internet connections</li> <li>• Launch of successful digital learning projects in some countries following the COVID-19 pandemic</li> <li>• The increasing involvement of the private sector in digital learning</li> </ul>	<ul style="list-style-type: none"> <li>• Limited progress in creating curriculum-aligned high quality and engaging digital learning resources in Africa</li> <li>• Limited skills of teachers, curriculum designers and textbook publishers in creating high quality and engaging digital learning resources</li> <li>• Lack of regional platforms for exchanging content</li> <li>• Limited innovation in the hybrid and blended forms of learning</li> <li>• Limited adoption of MOOCs and SPOCs platforms in higher education</li> <li>• Limited analysis of the impact of digital platforms on learning</li> <li>• Limited use of digital technologies for assessment and academic integrity</li> </ul>
<p><b>National capacities to articulate and promote digital education</b></p>	<ul style="list-style-type: none"> <li>• Improvements in digital government and e-participation across Africa</li> <li>• Improvement in regulatory frameworks in the communication sector</li> </ul>	<ul style="list-style-type: none"> <li>• Most African countries lack capacities to articulate, develop, and implement digital education policies and strategies,</li> <li>• Current digital education policies and strategies are not comprehensive and do not cover all the building blocks of digital</li> </ul>

Attribute	Enablers	Inhibitors
	<ul style="list-style-type: none"> <li>ICT sector regulators are increasingly playing roles in online safety and financing digital education through the Universal Service Fund</li> </ul>	<p>education,</p> <ul style="list-style-type: none"> <li>Lack of legislation on online safety and those promoting rights of online access to digital information (i.e., including equal access to information, limiting Internet shutdowns, curbing online gender-based violence, etc.).</li> <li>Absence of special guidelines for inclusive digital education, especially those concerning girls, children and youth in remote areas, people on the move and students and teachers with disabilities.</li> </ul>
<b>Data and analytics</b>	<ul style="list-style-type: none"> <li>Growing understanding of the importance of data for accountability, education planning, monitoring and decision-making at all levels,</li> <li>Better data supply, management and use experience in some countries in Africa, like the Gambia<sup>37</sup> that can be shared with others,</li> <li>Increasing efforts to promote EMIS norms and standards,</li> <li>Opportunities are provided by emerging technologies such as artificial intelligence and big data analytics to analyse a wide range of real-time data.<sup>38</sup></li> </ul>	<ul style="list-style-type: none"> <li>Lack of clear vision and costed roadmap for education data and analytics,</li> <li>Lack of EMIS policy and procedures,</li> <li>Inadequate leadership and political will on data for education,</li> <li>Inadequate planning and limited financial resources for education data,</li> <li>Inadequate platforms for individual-level data management, including low-quality for integrating data beyond education,</li> <li>Lack of unique identifiers, metadata standards, education data models, architecture to facilitate data sharing and integration needs,</li> <li>Fragmentation of EMIS solutions due to multiple disconnected platforms maintained by different institutions,</li> <li>Lack of comprehensive calendar and data collection procedure,</li> <li>Weak data demand due to limited information literacy,</li> <li>Data are not used for planning and decision-making,</li> <li>Limited data analytic capacity of users and data providers.</li> </ul>
<b>Enterprise and innovation</b>	<ul style="list-style-type: none"> <li>Increasing support to EdTech enterprises</li> <li>Development of 4<sup>th</sup> Industrial Revolution strategies in some countries that encourage EdTech,</li> </ul>	<ul style="list-style-type: none"> <li>Nascent EdTech enterprise in many African countries - primarily focuses on installing networks at schools and colleges and customising business software for education,</li> <li>Structural challenges ranging from the</li> </ul>

37 See, How EMIS Data Drives Education Reforms, The Case of the Gambia, <https://www.globalpartnership.org/blog/how-emis-data-drive-education-reforms-case-gambia>

38 UNESCO, Reimagining the Future of EMIS, <https://en.unesco.org/sites/default/files/re-imagining-future-of-emis-seminar-wp.pdf>



Attribute	Enablers	Inhibitors
	<ul style="list-style-type: none"> <li>• The growing number of start-ups focusing on digital learning management solutions and personal tutoring services</li> <li>• Emergence of regional EdTech enterprises like Eneza and M-Shule</li> </ul>	<p>limited power supply, low broadband coverage in rural and remote areas, lack of devices, limited financial resources for EdTech-related programmes,</p> <ul style="list-style-type: none"> <li>• Lack of collaboration between EdTech enterprises in Europe, Asia, Latin America and Africa for promoting digital education,</li> <li>• Lack of awareness and skill in effectively integrating EdTech solutions in the teaching and learning process</li> <li>• Limited skills of EdTech enterprises in integrating frontier technologies like artificial intelligence, augmented reality, etc., in delivering their educational solutions.</li> </ul>
<b>Digital literacy and skills for teachers</b>	<ul style="list-style-type: none"> <li>• Increasing investment in teachers' digital literacy skills following the COVID-19 pandemic,</li> <li>• Increasing investment in advancing digital skills of pre-service teachers at teacher training colleges in Africa,</li> <li>• Availability of competency frameworks and tools that can be adapted to African settings for promoting appropriate digital literacy and skills for teachers.</li> </ul>	<ul style="list-style-type: none"> <li>• Limited adoption of teachers' digital competency frameworks,</li> <li>• Limited resources for providing digital literacy and skills for a large number of teachers in Africa,</li> <li>• Lack of coordination among digital literacy and skills providers (colleges, universities and specialised training centres), donors and decision-makers in formulating and implementing competency-based digital skills for teachers,</li> <li>• Limited opportunities for teachers to advance and upgrade their initial digital skills due to lack of certification and few digital professional development opportunities.</li> </ul>
<b>Digital literacy and skills for students</b>	<ul style="list-style-type: none"> <li>• Improving understanding of the digital literacy and skills gap in the continent through commissioned studies, especially those conducted by the IFC,<sup>39,40</sup> World Bank<sup>41</sup></li> <li>• Improving understanding of the role of digital skills providers like hubs and accelerators</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of competency framework for delivering digital literacy and skills at schools, TVETs and colleges</li> <li>• Limited number of teachers with hands-on experience to teach digital literacy and skills and mentor students.</li> <li>• Limited opportunities for coding at schools</li> <li>• Limited opportunities for digital entrepreneurship skills development at</li> </ul>

39 IFC, Digital Skills in Sub Saharan Africa, Spotlight on Ghana, [https://www.ifc.org/wps/wcm/connect/ed6362b3-aa34-42ac-ae9f-c739904951b1/Digital+Skills\\_Final\\_WEB\\_5-7-19.pdf?MOD=AJPERES&CVID=mGkaj-s](https://www.ifc.org/wps/wcm/connect/ed6362b3-aa34-42ac-ae9f-c739904951b1/Digital+Skills_Final_WEB_5-7-19.pdf?MOD=AJPERES&CVID=mGkaj-s)

40 IFC, Demand for Digital Skills in Sub-Saharan Africa: Key Findings from Cote d'Ivoire, Kenya, Mozambique, Nigeria and Rwanda, [https://www.ifc.org/wps/wcm/connect/b5ad161e-a2e2-4010-86f2-54717e68b239/Demand+for+Digital+Skills+in+Sub-Saharan+Africa\\_web.pdf?MOD=AJPERES&CVID=nEldzv7](https://www.ifc.org/wps/wcm/connect/b5ad161e-a2e2-4010-86f2-54717e68b239/Demand+for+Digital+Skills+in+Sub-Saharan+Africa_web.pdf?MOD=AJPERES&CVID=nEldzv7)

41 World Bank, Digital Skills: The Why, the What and the How, <https://thedocs.worldbank.org/en/doc/0a4174d70030f27cc66099e862b3ba79-0200022021/original/DSCAP-MethodGuidebook-Part1.pdf>



Attribute	Enablers	Inhibitors
<b>Research, Learning and Evaluation</b>	<ul style="list-style-type: none"> <li>• A growing realisation of the importance of evidence-based learning at national and regional levels</li> <li>• Substantial experience and evidence on the role of technology in teaching, learning, assessment and administration in the developed countries and also the south</li> </ul>	<p>TVET and university levels</p> <ul style="list-style-type: none"> <li>• Limited research in technology-based education in Africa, especially with regard to the aspect of equality and inclusion,</li> <li>• Lack of centres of excellence that conduct different aspects of digital technology integration in education in Africa</li> </ul>
<b>International cooperation and resources mobilisation</b>	<ul style="list-style-type: none"> <li>• Availability of programmes such as AfricaConnect that provided financing of connectivity in higher education</li> <li>• Increasing donor and private sector interest in analysing and financing digital education in Africa</li> <li>• Increasing donor and private sector participation in digital literacy and skills programmes.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of regional and sub-regional platforms for mobilisation of resources for digital education,</li> <li>• A few large-scale sustainable donors funding digital education,</li> <li>• Limited participation of the private sector in funding large scale digital education programmes in Africa,</li> <li>• Lack of coordination and experience sharing among development partners in financing digital education.</li> </ul>

### 4.3 Theory of Change of the Digital Education Strategy

The inhibitors of digital education outlined in Table 2 highlight areas of intervention of digital education in Africa to be addressed by the Digital Education Strategy and Implementation Plan. Transformations are specifically needed in access to digital infrastructure and affordability, NREN development, creation of integrated learning content and platforms that combine traditional (TV and radio) and modern tools (online digital content), building national capacities to articulate and implement digital education strategies, promoting digital literacy and skills for students and teachers and education data and analytics.

It is envisioned that:

- i. All African countries develop National Digital Education Strategies that serve as a basis for investment in accelerating digital infrastructure and ICT integration in teaching, learning, assessment, research and administration.
- ii. At least 50% of educational institutions attain safe and secure high-speed connectivity with costs below \$25 per Mbps/month.
- iii. Digital devices are accessible to at least 20% of students and 50% of teachers in the continent by 2027 and a third of students and all teachers by 2030. This also assumes the availability of digital assistive devices for a similar proportion of students and teachers with disabilities.
- iv. NRENs developed and sustained in all countries by 2027.
- v. All countries develop integrated curriculum-enabled digital learning content and platforms for teaching, learning and assessment for teachers and students by 2028.
- vi. All countries transitioned from headcounts and aggregated education data to granular individual-level data on students, teachers, institutions and processes underpinned by unique identity, intra and inter-education data integration and use of analytics to support decision-making at national, sub-national and institutional levels, including in the classrooms.
- vii. Digital literacy and skills become core competence of teachers in Africa, and
- viii. All students attain a minimum level of digital literacy and skills corresponding to their levels.
- ix. Leaders and member of the community acquire relevant digital literacy and skills.

A Theory of Change (ToC) for digital education shown in Figure 3 outlines the assumptions, inputs, outputs and outcomes. Regional digital education programme is primarily oriented toward supporting AU member States' efforts in enabling citizens, including the most disadvantaged, to benefit from increased access to digital infrastructure, content, literacy and skills to participate actively in the digital economy as envisioned in Agenda 2063. The African Union will leverage its coordination and convening capacity to accelerate digital education. The AU will play a key role in promoting regional guidelines and sharing best practices on digital education.

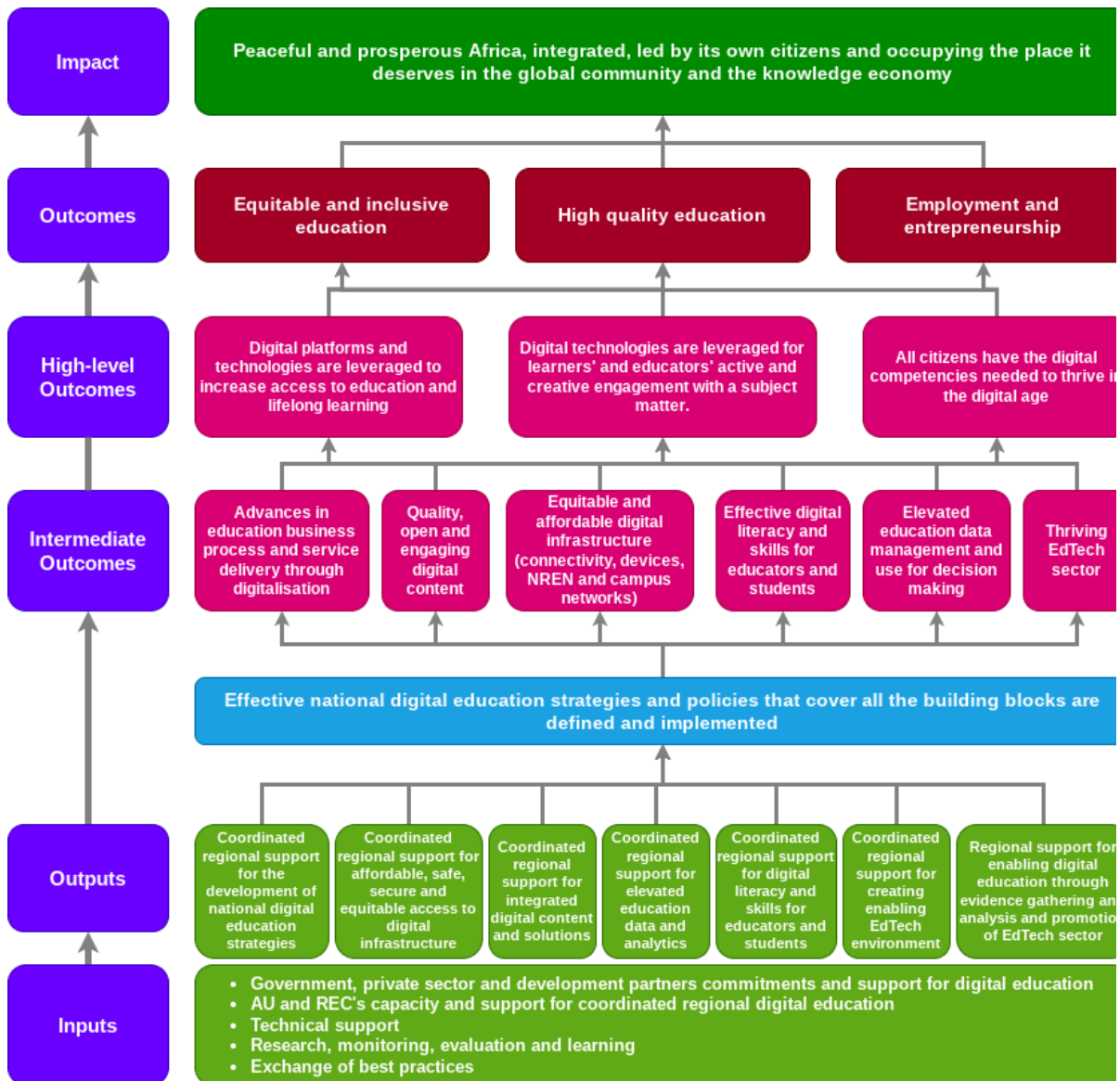


Figure 3: Theory of Change for Digital Education in Africa

The ToC assumes that the AU in partnership with RECs and development partners will support coordinated regional efforts to design and implement national digital education strategies. A coordinated regional effort towards the availability of affordable, safe, secure digital devices, connectivity, content, and platforms, elevated data and analytics and competency-based digital literacy and skills for students and teachers will contribute towards accelerated digitalisation in education. The AU will promote the collection of evidence to measure progress in digital education.

The ToC is based on the assumption that adequate resources are available from public, private, and development partners and from the AU itself to implement regional programmes. Political will, coordination and partnerships, especially with governments and development partners will be present to ensure digital technologies impact how to teach and learn and what to learn in the continent.

## 5. DIGITAL EDUCATION STRATEGY

### 5.1 Vision and Mission

#### Vision:

The African Union envisions **“a peaceful and prosperous Africa, integrated, led by its own citizens and occupying the place it deserves in the global community and the knowledge economy.”** Digital education will contribute to this AU Vision and enhance access, quality, relevance, and education affordability. Digital education (competencies, literacy and skills) will be built at all levels to promote digital citizenship, facilitate ICT use for teaching, learning and research, and enhance Africa's competitiveness.

#### Mission:

The Mission of the AU Digital Education Strategy is to **harness digital technologies to achieve the strategic objectives of the Continental Education Strategy for Africa**—namely: revitalising the teaching profession, improving learning outcomes, inclusion and equity, adult literacy, promoting Technical and Vocational Education and Training for employability and expansion of tertiary education, research and innovation and **providing all citizens with the digital competencies and skills needed to thrive in the digital age.**

### 5.2 Guiding Principles

The fast-advancing digitalisation in education and lessons from the COVID-19 pandemic indicate that a blended form of education that combines digital and face-to-face learning will be the norm in the next decade; thus, AU Member States need to prepare for eventual digital technology-driven education. Digital education must contribute to alleviating the challenges to education in the continent, discussed widely in this document. Furthermore, the education system must become an agent of change and innovation by accelerating digital literacy and skills to prepare learners for the challenges of today and tomorrow.

The AU and Regional Economic Communities (RECs) will play active roles in identifying, sharing, harmonisation and scaling up good practices, supporting the Member States with adopting digital education strategies and competency frameworks and promoting access to guidance, technical expertise and knowledge on digital education. The following principles will guide AU' and RECs' support of digital education in the continent:

- i. **Digital education should promote the core goals of education**—namely: equity and inclusiveness, access to education, affordability, and improved learning outcomes and employment.
- ii. **Digital education should be guided by a rigorous national digital education transformation strategy** that is aligned with regional standards and initiatives - to be used as the basis for a costed action plan and coordination among multiple stakeholders.

- iii. **Investment in digital education, including connectivity, devices, capacity, literacy and skills, should consider everyone**, especially those in rural areas, girls, children from the poorest backgrounds, children and adults with disabilities, and children and adults in settings of fragility, conflict and violence. In addition, particular attention should be given to reducing gender inequality in digital competence at all levels as this can help enhance girls' and women's employability and empowerment; and prosperity.
- iv. **Digital technology should be harnessed to facilitate flexible, accessible learning opportunities (e.g., micro-credential, alternative learning pathways)**, especially for out of school youth, adult learners and professionals, to help them re-skill, up-skill or change careers.
- v. **Digital competence should be a core skill for all educators**. Regardless of the level, all educators should be given the necessary digital competencies in leveraging digital technologies in teaching, learning, assessment, and research. Teachers need to have the capability to apply digital technologies in an effective and sound pedagogic approach that improves educational outcomes. In addition, women educators should be encouraged to excel in digital literacy and skills to serve as role models.
- vi. **Students' digital skills are essential to access education and online information, navigate the Internet safely and critically evaluate online information, participate in society, and employability in the digitalised world**. Competency-based digital literacy and skills should be given to all students at all levels to enable them to develop personally, engage actively in society, use public services, and exercise their fundamental rights.
- vii. **The education system should promote advanced digital skills and soft skills to ensure national and regional competitiveness, as outlined in the AU Agenda 2063**. Leaders should acquire the necessary digital literacy and skills to promote digital education at institutional, national and regional levels.
- viii. **The education system should provide integrated high quality, relevant and inclusive digital education content for all in alignment with the curricula**. The digital content should respect personal data protection and ethics and follow agreed standards at national and regional levels. It should incorporate accessibility to ensure those with disabilities have an equal opportunity for ICT-driven education. Digital education platforms should integrate all content available through TV and radio channels and e-content. Digital education should facilitate high quality technology-assisted assessments.
- ix. **Digital education is a task of everyone involved in education**. It should be underpinned by partnership and dialogue between different stakeholders, including educators, the private sector, researchers, civil society, and decision-makers.
- x. **Digital education should be driven by evidence and data to promote inclusion, ensure high-quality education outcomes and improve employability**.

## 5.3 Strategic Objectives

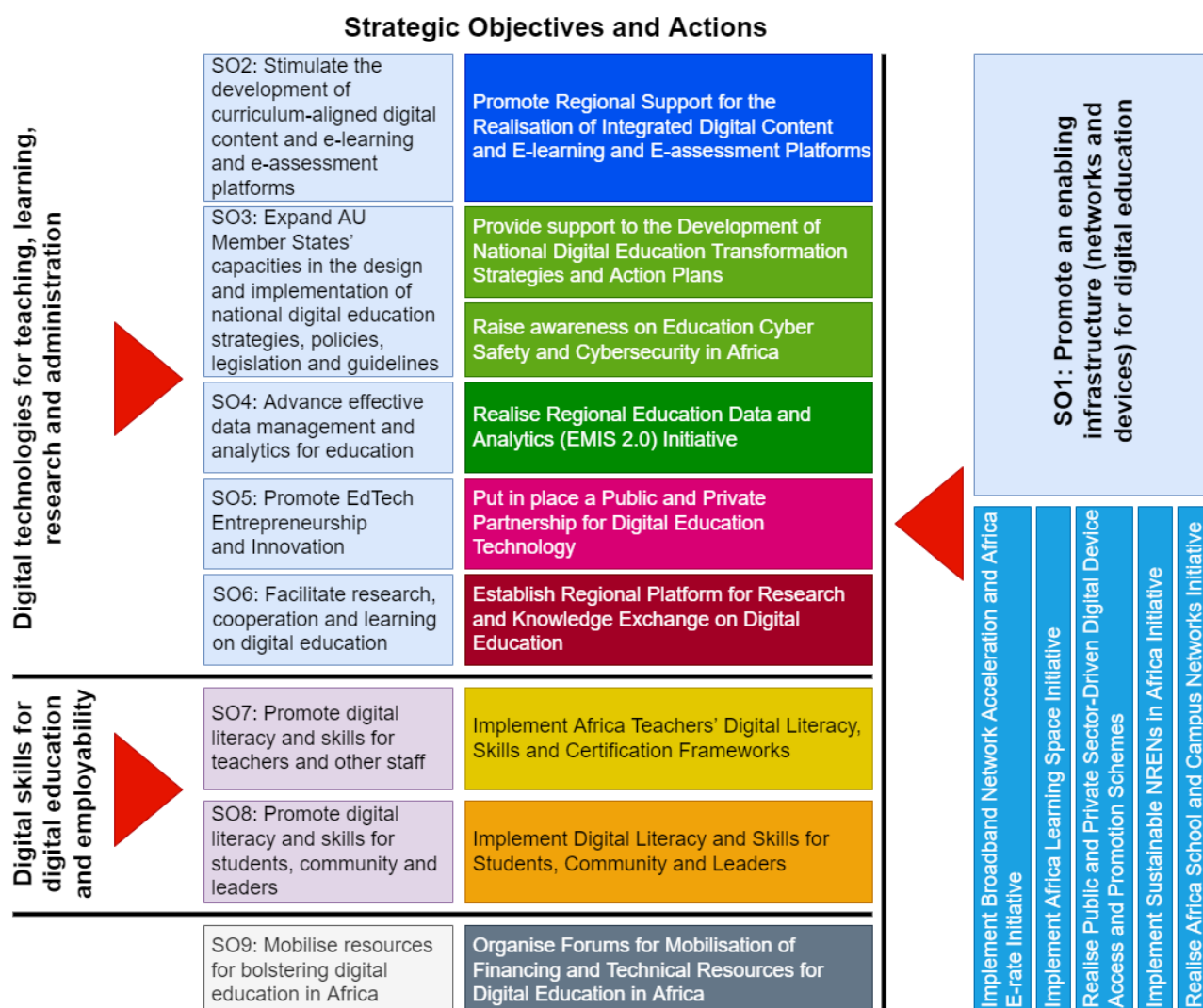
The Strategic Objectives of the AU Digital Education Strategy are built around the eight building blocks shown in Figure 4 and comprise the following:

- SO1. Promote an enabling infrastructure for digital education
- SO2. Stimulate the development of curriculum-aligned digital content and e-assessment and e-learning platforms
- SO3. Expand AU Member States' capacities to design and implement digital education strategies, policies, legislation and guidelines
- SO4. Advance effective data management and analytics for education
- SO5. Promote EdTech innovation and entrepreneurship
- SO6. Facilitate research and analysis on digital education
- SO7. Promote digital literacy and skills for teachers and other staff, and
- SO8. Promote digital literacy and skills for students.

The above activities will not be achieved without concerted effort in mobilising financial and other technical resources for the accelerated adoption of digital technologies in education. Therefore, it is essential to elevate the financing of digital education as one of the key strategic objectives of the AU in the coming years.

- SO9. Mobilise resources for bolstering digital education in Africa.

Figure 4 presents a number of tasks/actions that need to be undertaken to achieve each strategic objective. The strategic objectives and tasks are elaborated in subsequent sections.



**Figure 4: Overview of the AU Digital Education Strategy**

## 5.4 SO1: Promote an Enabling Infrastructure (networks and devices) for Digital Education

Infrastructure, including access to devices, networks, the Internet, and well-designed and managed campus networks, provides the foundation for digital education. Devices and connectivity networks offer educators and students with access to various resources. Connectivity is indispensable to access open science platforms and forge collaboration for research and innovation in higher learning. It is central to use educational resources by teachers and students.

School and campus networks are essential to aggregate connectivity and create an environment for efficiently managing and availing educational resources. Higher education demands advanced e-infrastructure such as High-Performance Computing to facilitate the conduct of



basic and applied research and promote collaboration among researchers. There are also maintenance, management, and sustainability issues of devices and networks that are often overlooked and more challenging to overcome, especially for schools. Regional policy harmonization and, infrastructure sharing will be critical to improve cross-border connectivity and attain economy of scale.

The sheer size of demand for high-speed connectivity and access to devices by hundreds of millions of students and staff and the impending challenge of establishing secure, resilient, and scalable campus and school networks must be addressed at national levels through partnerships between governments (especially between the Ministry of Education and Ministry of ICT), the private sector and academia.

There are many ongoing efforts to accelerate the availability of broadband infrastructure in Africa by government, the private sector and development partners, including the European Union, World Bank, the African Development Bank, the International Telecommunications Union (ITU) and multilateral and bilateral donors. For example, the Africa-EU Global Gateway Investment Package aims to support Africa for a strong, inclusive, green and digital recovery. The Global Gateway aims to accelerate universal access to reliable, safe and secure Internet networks in Africa.<sup>42</sup> The Giga project, which the ITU and UNICEF are implementing, aims to map schools' Internet access in real-time, creates models for innovative financing and supports governments contracting for connectivity.<sup>43</sup> The AU will continue to work with its Member States, the private sector, and a wide range of development partners to accelerate competition, regulatory reform, and public and private partnerships to ensure secure, affordable and high-speed broadband connectivity to everyone, including the education sector.

**Box V. Giga School Mapping and Connectivity Analysis in Rwanda**

ITU and UNICEF launched the Giga project in 2020 in Rwanda. The project has been working through the Ministry of ICT and Innovation and the Ministry of Education to undertake the mapping of school connectivity and develop financial models for sustainable access to digital technologies. In 2022, the Giga project mapped 4234 schools. The school mapping exercise shows that 1661 schools are off-grid, and 3551 are not yet connected to the Internet. Besides, 72,425 teachers and 1,059,314 Students need to access devices.

Further, 64,612 teachers need training in integrating digital technologies in the teaching and learning process. Giga estimates that the connection of the 1661 schools to electricity, 3551 schools to at least 25 Mbps Internet link and providing one device per three students and one laptop per teacher would cost US\$ 494,846,763.00. The cost includes training and capacity building for teachers and promoting access to online learning content.

*Source: Rwanda Giga Project.*

42 [https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world/global-gateway/eu-africa-global-gateway-investment-package\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/stronger-europe-world/global-gateway/eu-africa-global-gateway-investment-package_en)

43 <https://giga.global/>



The AU realises that the high cost of connectivity is the major impediments to digital education on the continent. Broadband affordability is shaped by policies, regulatory frameworks, business models, and commercial conditions across the network's international, cross-border and national segments. The private sector, including marine fibre owners (WACS, ACE, EASSY), regional backbone players (e.g., Liquid Telecom), and national mobile and fixed operators, play crucial roles in increasing access and reducing connectivity costs. Policymakers need to play a vital role in reducing taxes and enacting transparent policies, regulations, and laws that foster open access and competition. The dependence of landlocked countries on transit countries for access to submarine cables remains a critical challenge in Africa, with commercial conditions favouring coastal countries. Thus, particular attention needs to be given to inland countries' low broadband access and high costs. Landlocked countries should achieve favourable tariffs that stimulate affordable access to education.

National Research and Education Networks (NRENs) provide excellent platforms for aggregating broadband connectivity and other services for tertiary education. They can provide spill-over effects on digital education for basic education. Thus, sustainable NRENs must be recognised as a critical factor in delivering sufficient and reasonably-priced connectivity to higher education at the national level. NRENs have been established in forty countries in Africa, but most remain very weak in staffing and management, the services they deliver to the users' community and securing the necessary funding for sustainability. NREN readiness is achieved when sufficient government commitment is secured, an organisation recognised and supported by the public, and private higher education institutions is created. In addition, NREN organisations need to be adequately staffed to handle administrative and technical matters and have the capacity to negotiate connectivity deals on behalf of their members.

While school labs are essential, they are not conducive to competency-based interactive and blended learning, because the time of access to devices and connectivity via labs is often limited. Therefore, innovative business models that improve access to laptops and tablets for teachers and students across Africa, with a long-term vision of blended, hybrid and personalised education, are critical. Higher education requires investment in e-infrastructures, including high-performance computing, research data sets, apps and instrumentation to conduct basic and applied research to address problems in health, environment, climate change, agriculture, the blue economy, etc.

The availability of highly resilient, manageable and cost-effective school and campus networks is another barrier that needs to be addressed, along with the availability of devices and broadband connectivity to educational institutions. School internal networks and higher education campus networks suffer from poor design, fragmented institutional management, and lack of funding. The design and improvement of these networks is the responsibility of individual institutions. At the same time, a regional drive to increase public and private sector's awareness of the magnitude of the local networks bottlenecks is essential to develop solutions that accelerate safe and secure digital education.

Finally, the AU realises that Digital education necessitates the rethinking of learning space at schools, TVET institutions, colleges, and universities. African education institutions are built with traditional teaching methods and teacher-centred pedagogy—"chalk" and "talk" in mind. However, the gradual shift to competency-based education that demands interactive learning and the move away from listening to teachers as "knowledge-owner" to a "facilitator" means

that learning spaces need to be remodelled to support interactive activities. Digital education, including blended and hybrid learning, also necessitates that the schools, TVETs, colleges and universities of the future are built to accommodate the radical changes in pedagogy and mixed mode of education delivery.

To support the digital infrastructure for education, the AU will pursue the following actions at the regional level:

- i. Launch broadband network acceleration and an African e-rate drive to improve the affordability of broadband connectivity for education.
- ii. Introduce and promote an African Learning Space Initiative to ensure that education buildings are renovated and constructed to meet the learning mode in the digital age.
- iii. Promote public-private sector-driven device access schemes to ensure teachers and students access tablets and notebooks for learning, teaching and research.
- iv. Promote the development of National Research and Education Networks, and
- v. Promote academia, NREN and private sector-led initiatives to improve the design and delivery of resilient, secure and scalable school and campus networks.

### **5.4.1 Action 1: Implement Broadband Network Acceleration and Africa E-rate Initiative**

#### **Rationale**

The African broadband network acceleration and education e-rate drive is intended to respond to the limited availability and high cost of connectivity to schools, TVETs, colleges, universities, and relevant educational and research institutions. Expensive bandwidth makes sharing of teaching and research resources difficult and impedes innovation. Assessment of the cost of connectivity indicates that education institutions in Chad pay as high as \$900 per Mbps/month (90,000 times the \$0.01 per Mbps/month) envisaged by the African Union. Most African institutions pay between \$25-\$100 per Mbps/month (i.e., between 2500 and 10,000 times the target envisaged by the AU). Through the e-rate initiative, the AU, in coordination with RECs, will launch region-wide efforts towards negotiated discounted rates for the bandwidth for education.

#### **Partnerships for e-rate**

The AU will partner and synergise with bilateral and multilateral development partners, foundations, the ITU, United Nations Children's Fund, regional research organisations such as the Research ICT Africa Network (RIA) to assess the modes and cost of connectivity for education and devise a regional and sub-regional approach to accelerate connectivity and arrive at formulae and promote public-private sector partnership for reduced bandwidth costs. This action will leverage data from school connectivity projects such as the Giga Initiatives to determine the cost of connectivity for schools across Africa.

#### **Tasks:**

- i. Review of the current availability and cost of bandwidth for education across the region, including potential low-cost connectivity solutions for rural and underserved schools,
- ii. Arrive at education connectivity models and discount rate formulae based on variables

such as national infrastructure and regulatory environment, remoteness of school and college, inclusion issues such as gender, disability, children and adults affected by conflicts and disaster, network quality, ability to pay, etc.

- iii. Identify strategies to promote bandwidth availability and affordability, e.g., through Indefeasible Right of Use (IRU), using subsidy schemes via universal access funding, etc., and ensure financially sustainable strategies.
- iv. Publish education bandwidth availability strategy for Africa that covers connectivity options, reasonable cost and discounting rate formulae for all countries in a concise policy brief for decision-making,
- v. Organise regional meetings among Ministers of Education, Ministers of ICT and/or Head States Summit on digital education availability and affordability to present policy brief and raise awareness on the broadband needs and cost for digital education,
- vi. Hold sub-regional online and face to face dialogues between the private sector, regulators and decision-makers from education and ICTs on affordable digital education,
- vii. Promote education e-rate across the region, monitor progress in improving network affordability for schools, colleges, TVETs and universities and share success stories.

**Outcomes:**

- i. Improved understanding of the broadband network situation in the education sector and the cost of connectivity in Africa.
- ii. Reduced bandwidth costs that will eventually increase access for students, teachers, administrators, and other education professionals to well-designed, high-speed, safe, secure, reliable, and sustainable broadband networks.
- iii. Increased awareness of public and private driven broadband affordability strategies for education, and
- iv. Reduced costs of digital education in Africa towards the AU target of \$0.01 per Mbps/month.

## **5.4.2 Action 2: Implement African Learning Space Initiative**

**Rationale**

Digital education has tangible implications for reshaping physical spaces at schools, colleges, TVETs, and universities. Classrooms, libraries, STEM rooms and computer labs are often rearranged to promote active learning. However, the African learning spaces have not caught up with the changing education landscape, especially the eventual blended form of learning. The architecture of African educational institutions needs to change radically to facilitate innovative learning.

- First, there is a need to alter fixed structures like chairs and desks to facilitate flexible furniture arrangements for interactive learning. To enhance interaction, institutions need to gradually improve light, sound, temperature, air quality, links to nature, physical comfort, ownership, and flexibility in classrooms.
- Second, the renovation of educational institutions should consider the impending blended form of learning (e.g., retrofitting roofs with solar power panels and improving functionality in classrooms (e.g., repositioning boards or screens so that

both can be used simultaneously, adding electrical outlets to accommodate widespread use of laptops, tablets and wireless devices).

- Third, new construction of schools and colleges should be carried out with digital education and an interactive, learner-centred and blended form of education into consideration. New buildings should facilitate multiple learning activities fitted with wireless connectivity, campus fibre-optics backbones, green energy technologies, comfort, safety, on spot reconfiguration of classrooms for multiple uses, etc.
- Fourth, the reshaping of the African education space requires buy-in from policymakers, education planners, education institutions and architects across the region, which necessitates capacity building in rethinking the learning space for future education.
- Fifth, schools, TVETs and colleges need to consider specialised areas (classrooms) for innovation using digital technologies. This would include specialised digitally-enabled STEM labs, robotics labs, digital fabrication rooms, etc.

### **Partnerships for Physical Learning Space in Education Institutions**

The AU and RECs will partner with key players, including the World Bank, the African Development Bank, the Africa Union of Architects (AUA), regional and national architects' associations, to reshape educational institutions' physical space and buildings to facilitate digitally-enabled learning.

#### **Tasks:**

- i. Develop concise AU guidelines on learning space for different levels of education (early childhood education, basic education, TVET and higher education) to promote a digitally enriched student-centred interactive learning environment.
- ii. Organise regional meetings for decision-makers, education planners, education institutions leaders, and architects on the construction and renovation of education establishments for the digital age - to accommodate evolving student-centred pedagogy, competency-based curriculum, and blended learning.
- iii. Organise a regional contest on new learning space design and share the results for adopting best practices on the construction and renovation of educational institutions for modern pedagogy.

#### **Outcomes:**

- i. Increased awareness of the importance of redesigning future education buildings and their environment.
- ii. Educational learning spaces are redesigned to accommodate for current and evolving pedagogy and collaborative learning.
- iii. Educational institutions are built for the future.
- iv. Potential cost reduction and re-allocation of financial resources to other needs—e.g., access to digital technologies, electricity or Water, Sanitation, and Hygiene (WASH) facilities.

### 5.4.3 Action 3: Realise Public and Private Sector-Driven Digital Device Access and promotion Schemes

#### Rationale

Learners and educators need suitable equipment to make the most of modern education. Devices can be shared via school labs, yet research shows that individually owned tablets and laptops provide exceptional learning opportunities for students and enable teachers to integrate digital technology into the teaching and learning process. Therefore, it is essential to ensure equitable student and teacher access to individual devices, including assistive technologies, to support the learning of students with disabilities.

Cost is the major impediment for students and teachers in Africa to access digital devices. There are close to 300 million students and teachers that need digital devices in the continent, each costing over \$300 on average on an economy of scale basis; thus, the cost of these devices will be huge. Still, innovative schemes can facilitate gradual ownership and access to laptops, tablets and other devices by teachers and students. Potential devices access schemes include government subsidies for tablets and laptops, the use of universal access funds to purchase devices for students and teachers, and a mix of Bring Your Own Device (BYOD) and subsidies. Local capacities such as the assembly of devices at the national level and domestic maintenance and refurbishing capabilities could also play a critical role in accelerating affordable access to devices to students and staff. Parents would also play major roles in contributing to the access and maintenance of digital devices.

#### Partnership for Students' and Teachers' Access to Digital Devices

To support gradual access to devices, the AU will pursue efforts that bring the private sector's capabilities, decision-makers, and development partners together to develop strategies that result in more affordable and sustainable access to devices for students and teachers on the continent. The African Union and RECs will partner with key players in this area, including the European Union, the World Bank, the multinational private sector, including device manufacturers.

#### Tasks:

- i. Drawing on data and experience to date and results from initiatives such as the Giga Project to assess the extent of the need for devices for teachers and students in Africa based on the availability of other elements (e.g., electricity, connectivity and training). The assessment should also cover maintenance issues, local device production potential and aspects of e-waste.
- ii. Review all devices schemes that AU Member States use to promote access to tablets and laptops for students and teachers.
- iii. Review opportunities and challenges in accessing digital devices, including the availability of workbooks and textbooks through local assembly, maintenance, access to electricity, security and support issues in different countries.
- iv. Review the extent of need for digital assistive devices for people with disabilities in the region.
- v. Prepare a step-by-step public and private sector partnership-driven digital education devices scheme involving subsidies, parents' contribution, BOYD, local device

manufacturing, etc., to reach at least 20 million learners and teachers per year in Africa, possibly equipping at least half of the students and staff with digital devices for education by 2030. The scheme should ensure that there is no vendor lock in and digital harm to learners.

- vi. Establish Africa assistive technology fund to ensure that appropriate devices and tools are available for students and teachers with disabilities.
- vii. Organise high-level meetings on learning devices to secure commitments from the public, private sector and development partners, and
- viii. Share best practices and lessons on successful schemes for access to digital devices by students and teachers.

**Outcomes:**

- i. Innovative device access schemes that also address electricity, security, local device production capacity, maintenance and support issues are launched, and experiences are shared across Africa.
- ii. Learning devices and content are available for at least half of students and all teachers, administrators and other educational professionals by 2030.
- iii. Access to assistive technologies will reach at least half of those with disabilities by 2030.

**5.4.4 Action 4: Implement Sustainable NRENs in Africa Initiative**

**Rationale**

National Research and Education Networks (NRENs) are essential prerequisites for aggregating traffic at the local level and, in turn, connect to regional RRENs (RRENs) like the UbuntuNet Alliance, the West African Research and Education Network (WACREN), the Arab States Research and Education Network (ASREN) in Africa and to global ones like GEANT, Red CLARA, APAN or Internet2 so that there is full integration in the global research and education fabric. Moreover, NRENs provide secure and affordable services that support teaching and learning. They connect to open science platforms that foster research and innovation.

Forty of the 55 African countries are currently having some NREN activity. However, mature NRENs exist only in a few countries like Algeria, Egypt, Kenya, Morocco, South Africa, and Tunisia.

NREN maturity is achieved when sufficient government commitment (e.g., in terms of funding and policy support to enable an NREN to function as a licensed closed user group dedicated to promoting education connectivity) is secured, a formal organisation recognised, and public and private higher education institutions contribute its regular fees. Table 3 summarises the dimensions and requirements of a viable and sustainable NREN.

**Table 3: Requirements of a Sustainable NREN**

Dimensions	Requirements
<b>Commitment</b>	Governments' understanding of NREN benefits, financial commitment, policy and regulatory endorsement, a commitment of vice-chancellors and IT directors, especially from well-

	established universities, to work with smaller institutions for a common goal of connecting to each other.
<b>Coordination</b>	Membership, sustainable governance, and management framework - institutions, champions, strategies. Relevant national research strategies in support of RENs.
<b>Connectivity</b>	Affordable commercial condition, regulatory endorsement and options for NREN backbone, steady equipment supply.
<b>Capability</b>	Human resources and skills availability, certification and standards, training in internetworking and business development both at NREN management level and at membership universities.
<b>Content and services</b>	Sharable national resources, collaboration in OER, libraries, apps, national innovation systems, Identity Federation, eduroam, access to e-science infrastructure.
<b>Cash (financial resources)</b>	Public funds, donor funds, universal access funds for NREN backbone, membership contribution.

African countries that do not have an NREN and are not associated with one of the three regional RENs, namely UbuntuNet Alliance, WACREN, and ASREN, face significant challenges in getting affordable, high-capacity broadband connectivity to tertiary education institutions. Thus, there is a need to create new NRENs where they do not exist and strengthen early stage NRENs in the continent.

### **Partnerships for NREN Development**

To support further NREN development, the AU will partner with the European Union, the World Bank, RENs like the UbuntuNet Alliance, WACREN, ASREN and other players in this domain.

#### **Tasks:**

- i. Establish NREN development roadmap and business plans by drawing on global practices and experiences in the AU Member States. NREN development will leverage the experience and expertise of REN like the UbuntuNet Alliance, WACREN, ASREN.
- ii. Organise regional NREN development meetings by leveraging the Africa Research and Education Network (AFREN) platform.
- iii. Encourage RECs to embrace and promote NREN development in their respective regions.
- iv. Ensure that all countries that would like to strengthen NRENs develop business plans for sustainable NRENs.
- v. Mobilise resources for initial NREN start-up activities based on business plans, especially in those countries where they do not exist.
- vi. Accelerate access to e-research infrastructure.
- vii. Leverage existing RENs like UA, WACREN, and ASREN to create, strengthen and accelerate NREN development.



**Outcomes:**

- i. Sustainable NRENs are developed in all countries in Africa.
- ii. Increased access to e-infrastructure by researchers.
- iii. Increased connectivity, learning resource availability and research collaboration at higher education institutions in Africa, and
- iv. Spilling over effect of NRENs in providing connectivity and services to TVETs, and primary and secondary schools and promoting innovation (e.g., network security) in the public and private sectors.

### **5.4.5 Action 5: Realise Africa School and Campus Networks Initiative**

**Rationale**

Poorly designed school and campus networks will remain the bottlenecks to the future of digital education in Africa. Schools, colleges and university internal networks exist in many shapes, forms, and sizes with poor design, insufficient bandwidth, inadequate infrastructure, and poor management, thus unable to support advanced administrative applications and secured learning, teaching, and research environment.

The main challenges in developing schools, TVETs and higher education internal networks include reliance on the private sector for designing and operating such networks, lack of technical expertise at schools, TVETs, and higher education institutions' levels and limited coordination and governance of ICT activities. In addition, schools and universities are increasingly adopting large scale Wi-Fi networks that add complexity to network design and management.

**Partnerships for Internal Networks in Educational Institutions**

The AU recognises the impending bottleneck in schools, TVETs, colleges internal networks. It will pursue a private sector, university and NREN-led collaborative approach to raise awareness, promote internetworking skills and share practices in designing and deploying sustainable, scalable and secure internal networks at schools, colleges, TVETs and universities. The AU and RECs will partner with advanced NRENs, the private sector and international players in this domain.

**Tasks:**

- i. Forge public, academic institutions (NREN) and private sector partnerships for improved network architecture for schools in Africa.
- ii. Launch large scale public and private partnerships campus networks improvement drive at sub-regional levels that involve training, knowledge exchange, and ready-made network blueprints for different settings (rural schools, urban schools, small and large institutions, etc.) to emerge with optimal schools and colleges network architectures.
- iii. Build a regional community of practice on service-ready school and university campus network architectures.
- iv. Organise resources and share experience in designing and deploying schools, TVETs, colleges, and universities' internal networks.

**Outcomes:**

- i. Service ready network architecture for schools and well-designed campus networks for TVETs, colleges and universities.
- ii. Improvement in national education network resilience and security.

## **5.5 SO2: Stimulate the Development of Curriculum-aligned Digital Content, E-assessment and E-learning Platforms**

Digital education relies on online learning resources and associated e-learning platforms that enable the creation, adaptation, improvement and sharing of learning content. Primarily, there is a need for widespread availability of curriculum-aligned content in the corresponding national languages. While platforms such as Canvas, Schoology, Moodle, Blackboard, and Google Classroom are readily available for managing and delivering content at institutional levels, most AU Member States lack appropriate and cost-effective open-source platforms. Therefore, a significant amount of work lies ahead in creating and sharing digital educational resources that meet the context, curriculum, and pedagogy and evolving with national and regional open learning platforms.

There are multiple paths to the development of digital education resources. All curriculum-based national education content such as textbooks and learning resources such as high-quality videos and audio created during the COVID-19 pandemic can be digitised, organised and made available for students, teachers, and parents through multi-functional platforms and innovative technologies that allow deliver engaging personalised e-learning content based on learning trajectories. Efforts are needed to ensure those designing curricula are actively engaged in developing digital content and teachers are equipped with the necessary skills and coaching on content design and integrating digital technologies in teaching and learning in the classroom. A significant effort should also be made to curate open educational resources, freely available videos, apps, games, and research websites in alignment with the curriculum in the AU Member States. Teachers need to be trained in sifting through learning resources, adapting and sharing. Textbook designers and curriculum experts need to ensure learning content meets all the prescribed standards and textbooks are digitally stimulating by integrating relevant audio and videos, gamification and adaptive learning, etc.

Digital technologies play critical roles in promoting the integrity of assessments addressing the various forms of cheating ranging from plagiarism, fabrication, falsification, hacking into exams systems, delegation and outsourcing of exams, and transmitting assessments through messaging systems such as WhatsApp, Telegram or unauthorized collaboration such as working on exams as a network instead of prescribed individual work. Governments must explore various options like plagiarism detection applications and online exam control tools to mitigate academic integrity challenges. The increasing use of digital technologies in assessments also provides an engaging assessment experience for students and more meaningful data about students' skills and knowledge for teachers.

In recent years, the private EdTech sector and educational publishers are beginning to play a pivotal role in creating digital learning resources, with regional actors such as Eneza, Ubongo

and M-Shule now providing their services in multiple countries. Textbook publishers like those in Kenya have also been promoting digital textbooks and content for e-learning platforms. There has also been innovation in using offline learning platforms such as Kolibri to bring digital educational resources to areas with limited Internet connectivity, especially in rural schools, refugee camps, orphanages, non-formal school systems, and prison systems.

The low level of digital content means there is a need to step up advocacy and promote the availability of high-quality online educational content in Africa. Countries need to develop comprehensive and integrated learning infrastructure, for example, based on a model promoted through the Digital Infrastructure for School Education (DIKSHA) in India<sup>44</sup> that brings traditional media (TV and radio) together with e-textbooks, resources for those with disabilities, open educational resources, etc., delivered through web portals and mobile apps for teachers and students.

### **5.5.1 Action 6: Provide Regional Support for the realisation of Integrated Digital Content, E-assessment and E-learning Platforms**

#### **Rationale**

Africa has seen significant national activity in creating and exchanging digital learning resources during the onset of the COVID-19 pandemic. Some countries were able to sustain efforts in creating digital learning resources repositories, but the majority lacked infrastructure, devices, and digitally competent teachers to keep up the momentum.

A significant effort is therefore needed to improve the availability of curricula-aligned content for online learning. The development of content cannot be achieved without improved digital competencies of teachers in content creation. Thus, the AU Member States need to advance digital content by supporting teachers, curriculum developers, textbook designers and EdTech actors to continuously create, share, and adapt it to the local context.

At the same time, there is a need for suitable learning and assessment platforms adapted to the continent's needs. Most countries lack national e-learning platforms that collate education resources in one place and deliver these to a wide range of users (teachers, students, formal and informal learners, etc.) through diverse delivery channels (mobile, web portal, etc.). Progress with institutional platforms that can be adapted to different learning settings are also limited.

#### **Partnerships for Digital Learning Resources, e-assessment and e-learning Platforms**

The AU and RECs will work closely with content providers and actors like UNESCO, UNICEF, and OER Africa to support online learning content development and adopt affordable open e-learning platforms. **The AU will leverage the Pan African Virtual and e-university initiative to promote the delivery of content and e-learning platforms for tertiary education.** In addition, the AU will foster the growth of regional digital learning resources and create a knowledge exchange platform to encourage countries to share, expand, and sustain online learning resources and share their experiences in building and sustaining e-learning platforms.

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44 <https://diksha.gov.in/>

**Tasks:**

- i. Conduct an assessment of Africa's digital learning resources, e-assessment and e-learning platforms and best practices in using and Promote EdTech innovation and entrepreneurship sustaining online resources and e-learning platforms following the COVID-19 pandemic.
- ii. Promote national e-learning content by training and motivating teachers and involving textbook designers, and curriculum developers to create repositories of learning resources aligned to local curriculum, context and core languages (Swahili, Arabic, French, Portuguese, English).
- iii. Accelerate distance, hybrid and blended forms of learning,
- iv. Support the sharing of experience on the creation of sustainable and integrated national and regional e-assessment and e-learning platforms and leverage existing platforms from different institutions, partners and private sector.
- v. Promote regional online educational resources exchange.
- vi. Promote regional and national MOOC platforms for improved access to higher education and academic mobility.

**Outcomes:**

- i. Increased availability of digital learning resources for different contexts, curricula, languages and regional settings.
- ii. Improved experience sharing in creating, organising and adapting online assessment and learning resources and maintaining e-learning platforms.
- iii. Economy of scale and reduced costs of e-learning platforms.
- iv. Availability of up-to-date guidelines on developing and maintaining online educational resources and adopting and managing affordable national e-assessment and e-learning platforms.

## **5.6 SO3: Expand AU Member States' Capacities in the Design and Implementation of National Digital Education Strategies, Policies, Legislation and Guidelines**

An overarching policy and strategy must support digital education at the national level. Most countries in Africa lack well designed policies and strategies for digital education. The translation of digital education strategies into implementable actions is also crucial.

- First, countries need to develop digital strategies taking local challenges and international experiences into account.
- Second, digital education strategies need to be accompanied by implementable initiatives that deliver infrastructure (devices and networks), digital content and platforms, data and analytics, digital literacy and skills for students and teachers, among others.

- Third, countries need to ensure equity of access to digital technologies and safety in online environments.
- Fourth, countries need to encourage schools, TVETs and Universities to develop their internal digital strategies that align with national digital strategies.
- Fifth, significant investment is needed to manage change to ensure decision-makers, teachers, headteachers, and other stakeholders embrace digital education.

Developing a national digital education strategy is a multi-event step that involves a multi-stakeholder approach and ongoing consultation. Typical steps include (i) education business process analysis, (ii) outline of strategies for transformation of applications, data, and technology use in teaching, learning, assessment and research, (iii) consultation and validation of measures, and arriving at shared commitment to implement interventions. The AU will support:

- i. Creation and update of national digital education strategies as a basis of ICT investment in the Member States.
- ii. Development of legislation, guidelines and strategies to promote online safety and security of educational institutions.

### **5.6.1 Action 7: Provide Support to the Development of National Digital Education Transformation Strategies and Action Plans**

#### **Rationale**

Most African countries do not have policies and strategies to support investment in digital education. National digital education strategies were drafted in Ghana, Nigeria, and Togo, but they are not comprehensive enough to include all the building blocks outlined in this document. The development of national digital education strategies needs to begin with a comprehensive assessment of digitalisation at national levels. Tools like the European Framework for Digitally-Competent Educational Organisations (DigiCompOrg)<sup>45</sup> can be used to assess existing situations and identify gaps.

#### **Partnership for Development of Digital Education Strategies in the AU Member States**

The AU and RECs will coordinate with key development partners like the EU, World Bank, UNESCO, UNICEF, the Global Partnership for Education, and the African Development Bank to support Member States' efforts in developing and implementing national digital education strategies.

#### **Tasks:**

- i. Support AU Member States' efforts to review, adapt and strengthen their national digital education strategies in alignment with their national education strategies, the AU building blocks of Digital Education Strategy and Implementation Plan discussed in this document, technological trends and using tools such as the European Framework for

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<sup>45</sup> [https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg\\_en](https://joint-research-centre.ec.europa.eu/european-framework-digitally-competent-educational-organisations-digcomporg_en)

- Digitally-Competent Educational Organisations, etc.
- ii. Provide technical assistance in the development of a well-articulated national digital education transformation strategies in AU Member States. This would include:
    - a) Facilitating the engagement of stakeholders in the realisation of the priority digital education programmes at national levels.
    - b) Designing and implementing change management plans and capabilities needed to attain the transformation.
    - c) Identifying sustainable funding models.
  - iii. Promote the sharing of experience in designing and implementing national digital education strategies across the continent.

#### Outcomes:

- i. Full engagement and awareness of stakeholders on the different aspects of digital education.
- ii. Availability of national digital transformation strategies for education that serve as a basis for investment in the digitisation of education.
- iii. Improved investment in digital education.
- iv. Clear roles, responsibilities and coordination at national levels.

### 5.6.2 Action 8: Raise Awareness on Education Cyber Safety and Cybersecurity in Africa

#### Rationale

Digital education empowers students and teachers; at the same time, it exposes children and adults to significant safety and cybersecurity issues. The safety concerns range from mental health and well-being challenges associated with being online for long periods of time to risks such as harassment and cyberbullying, access to harmful online content, misinformation,<sup>46</sup> mal-information<sup>47</sup> and disinformation,<sup>48</sup> online gender-based violence or misuse of personal information by criminals for different gains. More connectivity also poses critical cybersecurity challenges ranging from malware attacks such as Distributed Denial of Service (DDoS) attacks causing massive disruption of the educational system, ransom attacks causing financial damages and fraud and data thefts that compromise students and staff data and safety.

While AU Member States were able to initiate cybersecurity strategies to meet the overall national challenges in cybersecurity, the situation analysis shows that the education sector in Africa remains unprepared to address the impending cyberattacks. Efforts by NRENs to establish Computer Emergency Response Teams (CERTs) and raise awareness have not scaled up to meet the cyber threat challenges facing the entire education system. The weak cybersecurity infrastructure, limited protection of databases, lack of cybersecurity policies, and limited skills put schools, colleges, and universities at risk. The low level of cyber safety knowledge is also a significant issue. Countries are also required to address ethical issues posed

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46 Misinformation is when false information is shared, but no harm is intended

47 Malinformation is when genuine information is shared to cause harm, often by moving information designed to stay private into the public sphere.

48 Disinformation is when false information is knowingly shared to cause harm.

by the growing adoption of artificial intelligence ranging from data governance, algorithmic discrimination to attribution of responsibility and liability in decisions taken by AI systems.

Governments need to strengthen the legal instruments and guidelines in dealing with online safety issues. Modernized, digital-oriented school curricula should also include digital citizenship and safety skills. The large gap in cybersecurity in education sector also demands regional efforts to raise awareness on the scale of the issue and potential solutions that countries and institutions can pursue to minimise cyber threats in education.

Educators should also be fully aware of the importance of cybersecurity and safety in student work and personal information. The acquisition of more data and the potential to leverage advanced analytics and artificial intelligence for teaching and learning should be matched with considerations of the ethical use of personal data. AI's proper functioning relies on the collection and analysis of personal data of students and staff. The collection of such confidential information raises serious issues of privacy and data protection. AI poses security challenges especially in verification, validation, self-awareness in adversary prone environments. Thus, guidelines on where and how that data is handled and the rights individuals have over its retention, use, and deletion should be available at all levels of education.

The private sector should guarantee that all their products have in-built privacy features and controls. Any information gathered from students should only be used for education purposes. It should not be sold, shared with third parties for marketing or advertising, or used to build student profiles without their consent.

Some countries have already initiated projects that promote online child protection; however, the experience across the continent shows a need for comprehensive regional guides for students' online safety and data privacy.

### **Partnership for Online Safety and Data Privacy in Education**

The AU and RECs will work with key players in the privacy and cybersecurity domain including NRENs, ITU, and the European Union to conduct a full review and develop guidelines on safety and cybersecurity for the education system to be adapted to different national contexts.

#### **Tasks:**

- i. Conduct a full review of the cybersecurity environment of educational institutions (schools, TVETs, colleges and universities) and outline strategies and steps to address the current gap at the national and regional levels.
- ii. Conduct an in-depth review of current practices in the protection of students, teachers and education sector online data.
- iii. Develop comprehensive guidelines on cybersecurity for the education system - focusing on specific guidelines for schools and TVETs and how to leverage NRENs for cyber-safety in higher education.
- iv. Develop regional guidelines on students' online safety and data privacy that countries and educational institutions can adapt.
- v. Support multifaceted initiatives funding, training, policies, technical solutions, readiness for cybersecurity in education – e.g., African cybersecurity week for education, Africa cyber safe day, cybersecurity skills framework, cyber challenges solutions prize, national schools and TVETs cybersecurity resource centres, NREN sponsored emergency



- response team (CSIRT, CERT, CIRTs),
- vi. Support the development and implementation of inclusive multi-stakeholder-driven national strategies for child online protection and data privacy.
  - vii. Raise awareness of cyber-safety and data privacy issues at national and regional levels for example, by holding workshops and forums where research on cybersecurity and cyber safety are showcased, and initiatives on cybersecurity and online privacy are promoted. Awareness can be created through print, radio, TV and digital media.
  - viii. Support cybersecurity knowledge exchange platforms on a sub-regional basis.

### Outcomes:

- i. Availability of guidelines, tools and initiatives for the protection of education data against cyberthreats.
- ii. An inclusive, multifaceted child online protection and data privacy strategy with effective and targeted measures and activities, including financial and human resources, is developed and implemented at the AU Member States level.
- iii. Improved understanding of cybersecurity issues at different levels of education.
- iv. Appropriate use and protection of personal data.
- v. Forums and workshops are leveraged to raise awareness on growing education cybersecurity, cyber safety and data privacy issues.

## 5.7 SO4: Effective Data Management and Analytics for Education

Several evaluations show that most African countries face challenges in producing education data that are timely, accurate and comprehensive. The challenges to education data analytics are multidimensional—they include a lack of appropriate data models, absence of open platforms that collect individual-level data, inadequate collection processes and procedures, poor data integration, and limited data use at institutional levels. In addition, most available data tend to focus on measuring access to education than equity, quality, affordability and relevance of education.<sup>49</sup>

Significant support was provided to African countries in strengthening their education data systems in particular by UNESCO, UNICEF, the Association for Development of Education in Africa (ADEA), the Pan African Institute for Development (IPED), the Global e-Schools and Communities Initiative (GESCI), the Global Partnership for Education (GPE), the World Bank and others, using the Education Data Quality Assessment Framework (Ed-DAQF) and the World Bank Systems Approach for Better Education Result (SABER)-EMIS tool.<sup>50</sup> However, while these initiatives were able to address some aspects such as data collection processes and quality issues, gaps still remain in all countries in the collection of individual-level data from all levels of education including Early Childhood Education, TVET, higher education, informal learning and

49 African Union and UNICEF, Transforming Education in Africa, An Evidence-Based Overview and Recommendations for Long term Improvements, <https://www.unicef.org/reports/transforming-education-africa>

50 World Bank, What Matters Most for Education Management Information System: A Framework Paper, <https://openknowledge.worldbank.org/bitstream/handle/10986/21586/944490WP00PUBL0Framework0SABER0EMIS.pdf?sequence=1&isAllowed=y>

data integration for decision-making at different levels—in the classroom, at the level of schools, districts, regions and nationally.

The growing demand for data on equity and learning outcomes, the increasing use of digital technologies in teaching and learning, the availability of the vast amount of data generated through learning management systems, and the potential use of emerging technologies like artificial intelligence and data analytics are also putting a lot of pressure on the viability of existing platforms. The development of the EMIS system as an engine for management, monitoring, analysis, and improvement of education demands a fundamental shift from the traditional school census reporting to gathering individual-level data for evidence-based decisions at all levels. Data on individual student's characteristics (e.g., refugee status, disability status, out of school status) is critical for equity of access to education. Data should not only be available, but also needs to be used. For example, UNICEF's "data must speak" initiative shows that access, enrolment, attendance and learning outcomes improve when communities are provided with information on the local education situation.<sup>51</sup>

The following actions are needed to implement the shift:

- i. AU Member States need to work towards integrated EMIS that interconnect all data sources, including learning management systems critical for monitoring education outcomes.
- ii. Countries need to collect individual level data on institutions, students, staff and processes. Individual-level data integration and exchange cannot function without fundamental building blocks like metadata and unique identifiers for students, teachers, institutions and resources. Thus, countries need to assign unique identifiers that are permanent for schools (school ID), teachers (teacher ID), and students (student ID), with common coding and data standards.
- iii. Education data needs a data model and architecture that reduce the number of applications and platforms used for collecting education data by multiple institutions, especially those that do not necessarily contribute to improved access, equity, relevance and learning outcomes.
- iv. Schools, TVETs and universities should establish local information systems (e.g., student information system, TVET information system, and Integrated higher education information system) that seamlessly integrate into the national Education Management Information System.
- v. An integrated EMIS needs to be designed with all users in mind, especially teachers, headteachers, district planners and decision makers, parents, and students who must access relevant information to make pertinent decisions at those levels.
- vi. Data should not sleep—"data must speak". This can be achieved by opening data and improving data use by teachers, schools, TVET and universities internally and generating report cards/profiles for schools to engage with communities.
- vii. Increasing the analytical capacities and incentives of teachers, headteachers, and decision-makers are essential to use data for decision-making at the classroom, school,

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<sup>51</sup> <https://www.unicef.org/education/data-must-speak>

college, district, province and national levels.

- viii. Governments should allocate sufficient funds to enhance the overall EMIS ecosystem, especially for ongoing maintenance and further systems development.

Therefore, the AU will support a transition from EMIS 1.0, which primarily focuses on aggregate statistical data collection for generating annual reports, towards EMIS 2.0, which will focus on individual-level data and analytics for making decisions on access, affordability, and learning outcomes in education. EMIS 2.0 will leverage advances in platforms, real-time data, hybrid learning data, unique IDs, education metadata models and emerging technologies like artificial intelligence for data integration, visualisation and use.

### 5.7.1 Action 9: Realize Regional Education Data and Analytics (EMIS 2.0) Initiative

#### Rationale

The demand for equity and learning outcomes demands individual-level data for students, staff and institutions managed by open-source platforms (e.g., DHIS 2) that also support data integration within and beyond the education sector. Emerging technologies such as artificial intelligence and big data analytics play a major role in the advancement of EMIS; therefore, there is a need for improved integration of AI and big data analytics in the educational data ecosystem. The AU, in coordination with RECs, will support Member States' transition from aggregate headcounts to fully integrated data and analytics powered by open source and emerging technologies.

#### Partnership for Data and Analytics (EMIS 2.0)

The AU will work closely with key players working on the re-orientation of education data and analytics for decision-making at classrooms, schools, TVETs, universities, districts and national levels. In particular the AU will coordinate with UNESCO, UNICEF, the World Bank, EU, GPE, IPED, ADEA and GESCI, which are active in this domain in the continent.

#### Tasks:

- i. Conduct in-depth reviews of the current education data systems and analytics across the countries and at all level of education covering availability of the foundations such as unique IDs for students, staff and institutions, data models, governance, platforms, data integration, processes and procedures for data quality and analytics and usage.
- ii. Assess the implication of emerging technologies such as AI for EMIS 2.0.
- iii. Conduct regional EMIS 2.0 envisioning workshops based on recent experience in managing individual level students, staff and institutional data.
- iv. Develop an EMIS 2.0 framework for Africa with a focus on strengthening all the building blocks of data and analytics—namely: a) foundations like unique IDs, data models and metadata, b) Governance c) institutional level data management and integration systems, d) Procedures and processes, norms, and standards, e) Open platforms f) Data analytics and use, g) Emerging technologies integration.
- v. Mobilise support to enable countries to strengthen education data and analytics, advocate for optimal use of existing data to support policy and integrate innovation in

education data systems based on an EMIS 2.0 framework.

**Outcome:**

- i. Publication of a framework for EMIS 2.0 for Africa.
- ii. Establishment of a community of practice on African education data and analytics.
- iii. Improvement in decision-making at all levels of education, planning and international reporting.

## 5.8 SO5: Promote EdTech Innovation and Entrepreneurship

Digital education cannot be realised through the public sector and development partners' investments alone. The private sector is a crucial partner in delivering communication services, developing and maintaining teaching and learning materials and applications, and designing and implementing networks, hardware and software solutions for education. Analysis indicates that the African EdTech sector is emerging. Today, African EdTech assets are more focused on applications (primarily software-based content management and assessment solutions) than EdTech hardware. The low level of attention to hardware for example those that must function in the harsh weather environment (withstanding dust or power fluctuations, for example) shows the need for regional effort to guide EdTech solutions development in the continent.

The situation analysis also shows that Africa's EdTech start-ups need to be nurtured through further training, capacity building and interaction with their peers on other continents and improving their access to venture capital. Investing in infrastructure and last-mile connectivity that allow more students, teachers, school leaders, and parents access to high-quality, tech-enabled learning experiences will increase demand that will, in turn, impact on EdTech enterprises' development. Governments should also promote effective procurement to create a vibrant and level-playing market for the EdTech industry.

EdTech companies, on their part, need to upgrade their capacities and skills and embrace emerging technologies such as AI, big data analytics and blockchain, which are increasingly becoming essential for engaging digital education. In addition, they need to participate in collaborative efforts with universities and other actors to stimulate innovation in hardware, content and software to meet the African education sector's needs.

The development of a vibrant EdTech ecosystem is the responsibility of AU Member States. Regionally, the African Union and RECs will play catalytic roles in stimulating the education technology enterprise sector by promoting platforms for knowledge exchange and encouraging the Member States to create conducive environments for optimal EdTech sector growth.

### 5.8.1 Action 10: Put in Place a Public and Private Partnership for Digital Education Technology (EdTech) in Africa

**Rationale**

Assessment of the status of the EdTech sector indicates that the exchange of experiences, collaboration and partnerships needs to be strengthened between decision-makers, research organisations and EdTech companies in Africa and those in other parts of the world. In

coordination with all the players in the EdTech innovation space, the AU will promote platforms for networking and exchange of experience on EdTech development.

The initiative will begin with analysing the state of EdTech development (EdTech enterprises and EdTech training) across Africa to suggest series of strategies and actions to develop the EdTech ecosystem in line with education sector needs. It will also promote partnerships between the EdTech sector in Europe, the Americas, Asia, and Africa to ensure networking and experience sharing.

### **Partnership for Platform for EdTech Sector Development**

The AU will partner with the World Bank, bilateral and multilateral donors and EdTech players, including investors, incubators, accelerators, corporations, and other institutions like EdTech Hub, to strengthen the EdTech ecosystem in the continent.

#### **Tasks:**

- i. Assess the state of EdTech enterprises and EdTech training in higher education in Africa.
- ii. Review potential collaboration with African enterprises and universities worldwide to foster collaboration between African start-ups and institutions and those in other continents to solve educational development challenges.
- iii. Hold annual education decision-makers, academia and enterprises forums to facilitate the exchange of best practices and explore public-private partnerships on technology-enabled innovations and solutions in hardware, software, content and emerging technologies like AI, augmented reality, blockchain and robotics to improve teaching, learning, research, and administration.
- iv. Foster EdTech access to data and insights to allow for interoperability and design competitive solutions that meet education sector needs.
- v. Mobilise resources and joint projects between African EdTech enterprises and those in other regions to collaborate on projects that address educational needs in Africa.

#### **Outcomes:**

- i. Complete understanding of the challenges of and opportunities for EdTech enterprises and training in Africa and potential areas of networking with their peers in other parts of the world.
- ii. Improved competitiveness of EdTech sector in Africa.
- iii. Improved collaboration between African universities and EdTech institutions and their peers in other parts of the world on EdTech training and implementing solutions for education.

## **5.9 SO6: Facilitate Research, Cooperation and Learning on Digital Education**

The growing investment in digital technologies in Africa is not widely supported by evidence on the impact of digitalisation on teaching, learning, research, administration and innovation. Moreover, while insights on the use of technology in education are growing worldwide, the contexts in which digital technologies are applied in education in Africa vary broadly due to

resource constraints, including access to digital tools and the Internet and the weak digital skills of teachers. This diverse African context permits for innovation and experimentation that will considerably impact education. Other dimensions, such as gender aspects of digital education and access to e-learning for marginalised groups (students and teachers with disabilities, those on the move due to conflicts, minorities, etc.), need to be studied.

The situation analysis of digitalisation in Africa shows that except for isolated postgraduate research and a few commissioned studies, there are limited in-depth reviews on the different aspects of digitalisation in education in Africa, for example, on the effectiveness of policies and programmes, the impact of digital determinants like infrastructure and online educational resources and platforms on learning, the impact of teachers' digital skills on learning outcome, the extent to which EdTech development facilitate digital education, the link between education data and analytics and effective planning, etc., to guide decision-makers and other stakeholders. In addition, the integration of emerging technologies such as AI, augmented and virtual reality, related ethical issues, and implications of these frontier technologies on learning outcomes, equity, and accessibility require sustained investigation.

The COVID-19 pandemic and the growing use of digital technologies point to the need to create a culture of innovation in using digital technologies for teaching, learning, research, and administration informed by evidence-based reasoning. To build an evidence-based digital education, the African Union will promote a platform to exchange digital education research and knowledge.

### **5.9.1 Action 11: Establish Regional Platform for Research and Knowledge Exchange on Digital Education**

#### **Rationale**

Building an evidence-based digital education will address the current knowledge gap on the link between digitalisation and access, equity, quality, relevance, and affordability. Furthermore, evidence will empower decision-makers on the best way to introduce, nurture, and advance digital education, taking Africa's technical, skills, and financial constraints into account.

Evidence on digital education will be meaningless if it is not shared to inform policy and practice. Therefore, in coordination with Regional Economic Communities, the African Union will promote a digital education research exchange platform that will facilitate the sharing of in-depth analyses on the different themes of digital education with policymakers and stakeholders in the continent.

#### **Partnerships for Evidence on Digital Education**

The AU will coordinate with key actors on evidence-based education, such as UNICEF, UNESCO, the European Union (e.g., Joint Research Centre (JRC), EU Digital Education Hub) and academia. In addition, it will forge partnerships between academic institutions, development partners, the private sector, and decision-makers via platforms dedicated to digital education research and knowledge exchange.

#### **Tasks:**

- i. Conduct a systematic review of the level of evidence in digital education in Africa, the



- players and current insights and evidence.
- ii. Establish funding for evidence-based digital education.
  - iii. Drawing on experiences of African Higher Education Centres of Excellence (ACE),<sup>52</sup> support the establishment of centres of excellence on digital education research in Africa (covering broad issues such as infrastructure, platforms, applications and innovation, policies and regulations, data and analytics and equity dimensions (e.g., gender, disability, refugee status), the impact of emerging technologies like AI and facilitate collaborative research between academia across the continent and these centres.
  - iv. Explore areas of collaboration and potential synergies with similar initiatives in other regions, e.g., JRC and EU Digital Education Hub.<sup>53</sup>
  - v. Promote the hosting of an online resource for digital education research to disseminate evidence on ICT applications in teaching, learning, research and administration.
  - vi. Host annual stakeholders' meetings/forums on digital education evidence that bring researchers, decision-makers and the private sector together.

### Outcomes:

- i. A systematic review of evidence on digitalisation in education is conducted, and results are presented.
- ii. Digital education is increasingly supported by evidence.
- iii. A platform for the exchange of best practices and research collaboration is created.
- iv. International collaboration on evidence-based digital education promoted.
- v. Digital technology investments and policies are made based on sound evidence.

## 5.10 SO7: Promote Digital Literacy and Skills for Teachers and Other Staff

Teachers and non-teaching staff are front-line workers in developing the digital literacy and skills of children and adults and the use of digital technologies in teaching, learning and research. Therefore, teachers and other staff need sufficient training to deploy and teach about and use digital technologies in the classroom.

In Africa, digital literacy and skills for teachers are provided through ICT education during pre-service training or at ad hoc in-service workshops. Studies show that next to other limiting factors such as access to connectivity, devices, and learning content, overall, teachers' digital education been the barrier to their adoption of ICT in the classroom.

To improve the situation, teachers' digital literacy and skills should be informed by competency frameworks and delivered on ongoing basis. Several competency frameworks are available on what teachers should learn concerning digital technologies. Teachers should have essential ICT skills for integration in the classroom, information literacy and collaboration skills to work with their peers in adapting content, and online safety skills to stay safe and ensure the safety of their students. Once trained, teachers need to be certified. In addition, they must be recognised for their efforts in developing and adapting educational content and integrating digital

<sup>52</sup> <https://projects.worldbank.org/en/projects-operations/project-detail/P126974?lang=en>

<sup>53</sup> <https://education.ec.europa.eu/focus-topics/digital-education/digital-education-action-plan/digital-education-hub>



technologies in the teaching and learning process.

### 5.10.1 Action 12: Implement Africa Teachers' Digital Literacy, Skills and Certification Frameworks

#### Rationale

The limited progress in integrating digital technologies in teaching and learning compared to investment in digital infrastructure has prompted teachers' digital literacy and skills improvement based on a competency framework. The two widely used competency frameworks include the UNESCO ICT Competency Framework for Teachers (ICT-CFT)<sup>54</sup> and the European Commission DigComp framework for educators (DigCompEdu).<sup>55</sup> The UNESCO ICT-CFT comprises six focus areas (ICT in Education, curriculum and assessment, pedagogy, application of digital literacy and skills, organisation and administration and teachers' professional learning) across three phases of knowledge acquisition. DigCompEdu, which can also be used for teachers' digital competency, proposes 22 competencies organised in six areas—professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating digital competence.

There are several successful adaptations of the DigComp framework to facilitate teachers' skills development. For example, Spain has developed a refined Common Digital Competency framework for teaching, which contains a standardised proposal for competencies divided into five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving.<sup>56</sup>

Drawing on these experiences, the AU will drive a common framework of teachers' digital skills in the continent. The African Teachers' Digital Skills and Certification Framework will establish, disseminate and encourage the use of a region-wide competency framework for delivering digital skills for pre-service teachers and through peer learning and teachers collaboration workshops for in-service teachers. Such a competency framework will consider issues ranging from low access to digital solutions in the continent to the potential integration of emerging technologies such as artificial intelligence in teaching and learning.

Teachers who complete the courses should receive a certificate of competency based on an agreed set of standards. The certificates can be used as a basis for recognition and career development. The availability of the African Certificate for Teachers Digital Education (ACTDE) will ensure that teachers' digital skill becomes a central competency and that it is recognised regionally. It will stimulate harmonised and mutually recognised skill sets that the governments, employers, and other stakeholders can apply to advance teachers' careers. It will reduce the proliferation of certification schemes by multiple organisations.

#### Partnership for Teachers Digital Literacy, Skills and Certification

The AU will partner with key players, including UNESCO, GESCI, UNICEF, ILO, and EU's Joint Research Centre, to develop a regional digital competency framework for the teaching

54 <https://en.unesco.org/themes/ict-education/competency-framework-teachers>

55 <https://ec.europa.eu/jrc/en/DigCompEdu>

56 INTEF, Marco Común de Competencia Digital Docente, <http://educalab.es/documents/10180/12809/MarcoComunCompeDigiDoceV2.pdf>

profession that draws on practices to date and regional context. It will introduce certification scheme to improve the recognition of teachers that complete digital courses. The African Certificate for Teachers Digital Education will also work closely with the EU-funded Africa Continental Qualification Framework, which covers teachers' subject areas and digital qualifications.<sup>57</sup>

**Tasks:**

- i. Conduct a comprehensive assessment of digital literacy and skills curriculum and training in pre-service teachers' education in Africa and in-service training workshops.
- ii. Review regional experience in adopting the UNESCO' ICT Competency Framework for Teachers and the EU Digital Competency Framework for teachers' digital literacy and skills, including practices, opportunities and challenges to provide guidelines on localisation of the most appropriate Framework.
- iii. Develop and publish an African digital competency framework for teachers through the involvement of educators, in-service and pre-service teachers and other stakeholders active in the development of teachers' digital literacy and skills in Africa.
- iv. Organise series of sub-regional workshops to refine and endorse the African competency framework for digital literacy and skills for teachers.
- v. Encourage countries to deliver digital literacy and skills in pre-service environments and through in-service peer learning using the African digital competency framework for teachers.
- vi. Review current digital literacy and skills for teachers and related certification schemes.
- vii. Conduct a feasibility study on uniform regional teachers' digital literacy and skills certificates and propose its implementation.
- viii. Pilot a digital literacy and skills certification scheme and calibrate it to arrive at an African Certificate for Teachers Digital Education.
- ix. Leverage existing and upcoming sub-regional and regional initiatives, including the EU-funded Regional Teachers Initiative, to mobilise expertise and resources to achieve maximum impact on teachers' digital competencies and skills (items I to viii).

**Outcomes:**

- i. Understanding of teachers' digital literacy and skills issues, opportunities and challenges in Africa.
- ii. Publication of African competency framework for digital literacy and skills for teachers that draws on international practices and regional contexts.
- iii. Teachers improve and update their digital skills and equipped to integrate digital technologies in teaching and facilitating learners' acquisition of digital competencies.
- iv. Availability of African Certificate for Teachers Digital Education that facilitate competency and mobility of teachers.

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<sup>57</sup> <https://acqf.africa/>

## 5.11 SO8: Promote Digital Literacy and Skills for Students, Community and Leaders

The African Union Agenda 2063 emphasises the importance of education that prepares students with the right skills for the digital economy. Twenty-first-century skills demand computational thinking, critical thinking, complex problem-solving, communication and collaboration, entrepreneurial spirit, and the ability to harvest the potential of digital technologies for work and life. Furthermore, digital literacy and skills development should start early and be inclusive of girls and children with disabilities.

Students need various skills ranging from essential digital competencies to specialised advanced skills. First, they need soft skills such as effective communication, social and emotional intelligence, critical thinking and adaptability. Second, students need media literacy to protect them from misinformation and disinformation dangers. Finally, they require future-oriented skills and competencies to bolster their employability.

The situation analysis and several studies indicate a huge gap between students' foundation ICT skills and those desired in the contemporary knowledge economy. This means that schools, TVETs and universities in Africa need to shift from basic ICT training towards 21st Century Skills. Students should be given chances to upgrade their digital literacy and skills in all fields of education, including computer science, communications, health and statistics. For example, healthcare professionals must have data science skills to integrate technology into their daily work.

Attention should also be paid to gender equity in digital technologies in schools, TVET institutions and colleges. It is important to boost the number of girls joining the digital technology field by encouraging their participation in STEM subjects and increasing female role models.

Schools, TVETs and universities could also play critical roles in accelerating of digital literacy and skills of members of the community including leaders, parents and lifelong learners. Digital literacy and skills of leaders (e.g., school headteachers, university and TVET senior managers) is crucial for acceleration of digital education in the continent.

Several steps can be taken to enhance student's digital literacy and skills:

- First, AU Member States need digital literacy and skills and literacy standards for students—from early childhood to higher education. There are many competency frameworks for digital literacy and skills at basic education levels, including the UNESCO Global Framework of Reference on Digital Literacy Skills, the European Commission DigComp framework, and the Digital Intelligence (DQ) framework that the Member States can adopt.
- Second, students need to be taught to develop entrepreneurship skills, soft skills and coding skills to facilitate adaptability and computational abilities. Computational thinking is crucial for a number of other 21st century and foundational skills—e.g., problem-solving, creativity, collaboration—and, thus needs to be integrated into primary and secondary schools' curricula, as a separate subject, as a cross-curricula

theme or within other subjects like Mathematics and Technology.<sup>58</sup>

- Third, as a student progress through education towards TVET and higher education levels, his/her digital competencies need to be built for the job market. Primarily, the Ministries of Education and those responsible for employment need to ensure that competencies and skills match the demands of the job market. Students that pursue computing, engineering and related fields can also continue with advanced digital skills, especially those related to emerging 4th Industrial Revolution technologies such as augmented reality, AI, autonomous vehicles, blockchain, big data analytics, Internet of Things (IoT), robotics, etc. in close alignment with the industry to meet the demand of the job market.
- Fourth, the African digital literacy and skills should be regularly adapted and aligned with the needs of the digital economy—especially applications in manufacturing, construction, agriculture, health, tourism and services, where the potential for employment exists.
- Fifth, schools, colleges, TVETs should serve as venues for delivery of digital skills for the community, decision makers and education sector leaders.

### 5.11.1 Action 13: Implement Digital Literacy and, Skills and Coding Framework for Students, Community and Leaders

#### Rationale

Digital literacy and skills are critical for students to prepare for the digital economy's jobs market and protect themselves from existing threats in the digital world. The AU will support students' digital literacy and skills by developing a region-wide competency framework for early childhood, primary and secondary education that provides for the integration of key topics in curricula at all education levels. It will also stimulate generic ICT skills for all citizens through formal and informal education settings and by leveraging schools as digital literacy hubs for the community.

It is essential to combine digital literacy and skills with soft competencies such as problem-solving, critical thinking, communication, collaboration and entrepreneurship abilities at all levels of education. AI and analytics are taking off worldwide; thus, national curricula should be adapted to include the competencies that include coding, statistics, entrepreneurship, computational thinking, data and algorithm literacy that empower students to understand, leverage and build using frontier technologies like AI, blockchain and IoT. Students in higher education must acquire vital skills in understanding algorithms, machine learning and data science that underpin the fourth industrial revolution. Higher quality education, skills and training programmes that integrate AI and facilitating research on the development in AI are also crucial.

The AU, in coordination with RECs and partners, will promote digital competency and coding

58 See European Experience in this area, European Commission, Reviewing Computational Thinking in Compulsory Education: State of Play and Practices from Computing Education, <http://www.eun.org/documents/411753/817341/Reviewing+Computational+Thinking+in+Compulsory+Education/a88b8d18-9065-4755-adb1-54b1c3b2d31f>

for the information economy to accelerate the attainment of the vision of Agenda 2063.

### **Partnership for student's digital literacy and skills**

The AU will work collaboratively with academic institutions, RECs, European Union, GIZ, the private sector, and others active in equipping African youth with digital literacy and skills to foster students' learning, employability, and safety.

#### **Tasks:**

- i. Review, identify learning goals, adopt and promote regional digital literacy and skills' competency framework for early childhood, primary and secondary education by drawing on experiences like DigComp, UNESCO Framework for Reference on Digital Literacy Skills, OECD Skills research Framework or Digital Intelligence (DQ) framework.
- ii. Review, adopt and promote basic digital competencies to be delivered for education leaders, parents and communities at schools, colleges, universities and TVETs and non-formal education settings (by leveraging investments made in equipment, connectivity and digital skills for teachers in the formal education sector).
- iii. Develop guidelines on the incorporation of coding into the curriculum of basic education.
- iv. Review, assess and develop guidelines for delivering digital literacy and skills through Technical and Vocational Training and Education, in alignment with job market and industry requirements.
- v. Review, assess and develop guidelines for 4IR skills (including coding, statistics computational thinking, data and algorithm literacy) in higher education.
- vi. Stimulate Specialised ICT skills and coding in Africa through existing platforms and innovative programmes like the Africa Code Week with attention to including more girls and children, and adults with disabilities.

#### **Outcomes:**

- i. Harmonized and well-developed approach to basic digital competencies and advanced digital skills in the continent that responds to Agenda 2063.
- ii. Digital competencies strengthened at all levels of education.
- iii. Digital and literacy provided for education sector leaders.
- iv. Citizens are digitally empowered – closing the digital divide
- v. Emergence of a critical mass of African digital specialists that develop socially relevant and economically sustainable digital solutions.
- vi. Participation of girls and students with disabilities in advanced digital skills and jobs.

## **5.12 SO9: Financing and Resources Mobilisation for Bolstering Digital Education in Africa**

Digital education involves the availability of devices, connectivity, learning platforms, applications and services, and other flexible and adaptable campus networks that demand substantial financial resources. Planning and investing in digital education should be country-led and context-specific. Sustainable financing of digital education is, therefore, a responsibility of AU Member States. Governments should ensure that all the building blocks of digital education,

ranging from infrastructure to skills to data and analytics, are funded adequately using local financial resources and using a mixture of investment models, including universal access funds and public and private financing and development aid, as appropriate. Experience shows that the bulk of digital education financing should come from the government budget. At the same time, funding of digital education systems depends not only on the amount of money being spent but also on how it is allocated; thus, ongoing evidence-based prioritisation of digital education financing is critical.

Experience of successful projects suggests that digital education is sustained when resources are pooled together to bring about large-scale transformation. Thus, it is essential to initiate an AU-led regional effort to promote digital education via concerted communication and awareness raising efforts and mobilisation of funding for potentially transformative digital education programmes at regional levels while also securing national commitments to facilitate the implementation of digital strategies at country levels.

The Digital Education Strategy and Implementation Plan presented in Appendix A envisage a funding requirement in the amount of US\$60 million to implement the regional initiatives discussed above.

### **5.12.1 Action 14: Organise Forums for Mobilisation of Financial and Technical Resources for Digital Education in Africa**

#### **Rationale**

Acceleration of digital education requires enormous financial and technical resources. Therefore, the AU will lead an effort to mobilise financial resources for regional interventions outlined in this strategy and to meet the different needs of its Member States. Drawing on this strategy, the AU will prepare a short communication document outlining priority areas of digital education and a proposal for enhancing international cooperation for advancing digital learning, teaching, assessment, research, innovation and literacy and skills in Africa. Subsequently, it will organise two forums that bring ministers, development partners, the private sector, and civil society together to discuss the proposal and secure commitments for financing digital education.

#### **Partnerships for Financing Digital Education**

In collaboration with RECs, the AU will partner with Multilateral Development Banks (MDBs) like the African Development Bank and the World Bank and the private sector in preparing communication documents and proposals and for preparation of forums for financing digital education in Africa.

#### **Tasks:**

- i. Drawing on this strategy, develop promotional documents and proposals for financing digital education to implement the AU Digital Education Strategy and Implementation Plan and support Member States' efforts to implement their national digital education strategies.
- ii. Distribute promotional and communication materials, advocate for and raise awareness of decision makers on priority areas of digital education.
- iii. Organise two public and private sector and development partners forums on financing

digital education. The first forum would be organised at the beginning of 2023 and the second in 2026 to ensure continuity of mobilisation of resources for this growing area.

- iv. Work collaboratively with development finance institutions and multilateral development banks for the mobilisation of financing digital education on high impact and transformative programmes at the national and regional levels.
- v. Use policy and regulatory improvement incentives to encourage the participation of the private sector in the financing of digital education in Africa.

**Outcomes:**

- i. Awareness of the priority areas of digital education by member States and financial requirements of digital education by all stakeholders.
- ii. Funding of the AU Digital Education Strategy and Implementation Plan, and
- iii. Availability of financial resources for high impact digital education programmes at national levels mobilised through pledging from donors and the private sector.



## 6. COORDINATION CAPACITY FOR DIGITAL EDUCATION

The AU Digital Education Strategy and Implementation Plan recognise that essential supporting functions at the AU' Department for Education Science, Technology and Innovation (ESTI) and RECs levels need to change to achieve changes at the Member States level. Implementing the different building blocks of digital education discussed in this strategy requires considerable coordination, convening, resources mobilisation, knowledge mapping, management and sharing at AU and RECs levels. The AU will ensure that digital education is funded and sustained to guarantee that every child and adult has access to learning opportunities available through information and communication technologies. Therefore, the AU will endeavour to equip itself, RECs and the Member States with the necessary capacity to promote an effective digital education ecosystem in the continent.

### 6.1 Digital Education Coordination Capacity of the AU

The AU realises that digital education is a fast-moving target. Therefore, an adequate internal capability is critical to discharge its outreach, international cooperation, resources mobilisation, coordination, convening, performance tracking and knowledge sharing role in this area. To achieve this:

- First, the AU/ESTI will work with its partners to strengthen its internal digital education programme formulation and implementation capacity around the eight themes of digital education. In the beginning, this will be achieved through mobilising technical assistance on the different topics, in particular in the design and implementation of national digital education strategies. The technical assistance team will work closely with the AU staff to support the co-creation and co-design of digital education programmes in Member States.
- Second, the AU/ESTI will allocate resources to strengthen staffing in the digital education domain to provide ongoing technical assistance to Member States and coordinate different initiatives with partners. Specifically, the AU will strengthen its capacity in at least two aspects at the beginning—"digital education infrastructure and policy" and "digital education skills and applications."
- Third, the AU/ESTI will strengthen its knowledge mapping, management and sharing expertise on the different building blocks of digital education to serve as an information hub for its Member States. This will also allow the AU and its Member States to gather data and track progress on different themes of digital education. Digital education tracking, knowledge mapping, management and sharing will initially start in coordination with its partners, centres of excellence and eventually through the engagement of interns from the four language regions (Arabic, English, French and Portuguese). The involvement of interns in knowledge management will strengthen the capacity of young people in digital education subjects and increase the availability of data and information on digital education from and for all its Member States.

## 6.2 Building RECs' Capacity in Digital Education

The Digital Education Strategy and Implementation Plan entrust responsibilities to the RECs in supporting and coaching their Member States in developing and implementing national digital education strategies, mobilising resources, and promoting cooperation at sub-regional levels. This demands a complete understanding of the different aspects of digital education.

RECs have limited staff involved in the education sector, with exposure to the AU building blocks of digital education outlined in this Strategy. Therefore, it is essential to develop the internal capacities of RECs through technical assistance at the beginning. The technical assistance will primarily work with RECs' education staff to support their Member States' efforts to design and implement national digital education strategies.

Digital education will be a growing area of concern for the RECs, as outlined in their digital policies. RECs must therefore allocate resources to recruit a permanent digital education specialist to support Member States' efforts in this growing and dynamic area. RECs could also benefit from interaction with their peers in other continents, especially in Asia and Latin America, on digital education planning and implementation support practices at national levels.

## 6.3 Building the Capacity of Member States

The AU Member States will have the ultimate and critical responsibility in developing their digital education ecosystem. The situation analysis summarised in section 4.2 shows that most AU Member States did not have the capacity to design and implement national digital education strategies and mobilise resources. The diversity of African countries in digital infrastructure, education systems, policies and legislation, geographical location (islands, land-locked etc.), and digital education maturity means that AU's support to its Member States need to be tailored to these different national settings.

This means that the AU, RECs, technical assistance experts and Member states' stakeholders will work together to develop national digital education strategies through an iterative and consultative process- where all stakeholders set targets and develop priority programs around the different building blocks of digital education. The AU and RECs will ensure that relevant Ministries, Departments and Agencies, especially the Ministry of Education and Ministry of ICT, coordinate the realisation of digital education. Drawing on these experiences, the AU and RECs will develop step-by-step guidelines that other countries could use to develop and implement their national digital education strategies. The AU and REC will also organise regional forums, where decision-makers exchange experience on digital education.

Further, the AU will also support Member States' efforts to mobilise financial and technical resources for priority digital education programmes. In this regard, drawing on its experience, the AU will develop a guide on mobilising financial and technical resources for digital education at national levels. The AU Member States are also expected to benefit from active participation in the forums for financing digital education in Africa proposed in this Strategy and Implementation Plan.

## 7. DIGITAL EDUCATION IMPLEMENTATION PLAN

### 7.1 Timeframe for the Implementation of the Digital Education Strategy

The Digital Education Strategy Implementation Plan proposes a five-year timeframe between 2023 and 2028 to carry out the fourteen actions outlined above in three horizons, as shown in . Horizon 1, which will start in early 2023, will focus on setting the foundations and communicating digital education priorities with Member States. This will include preparation for carrying out different action plans, building the capacity of the AU and RECs, promoting digital education across Africa, mobilising financial and technical resources and initiating the first set of actions, such as the Africa E-rate drive, device access promotion schemes and design of national digital strategies in at least one country per region.

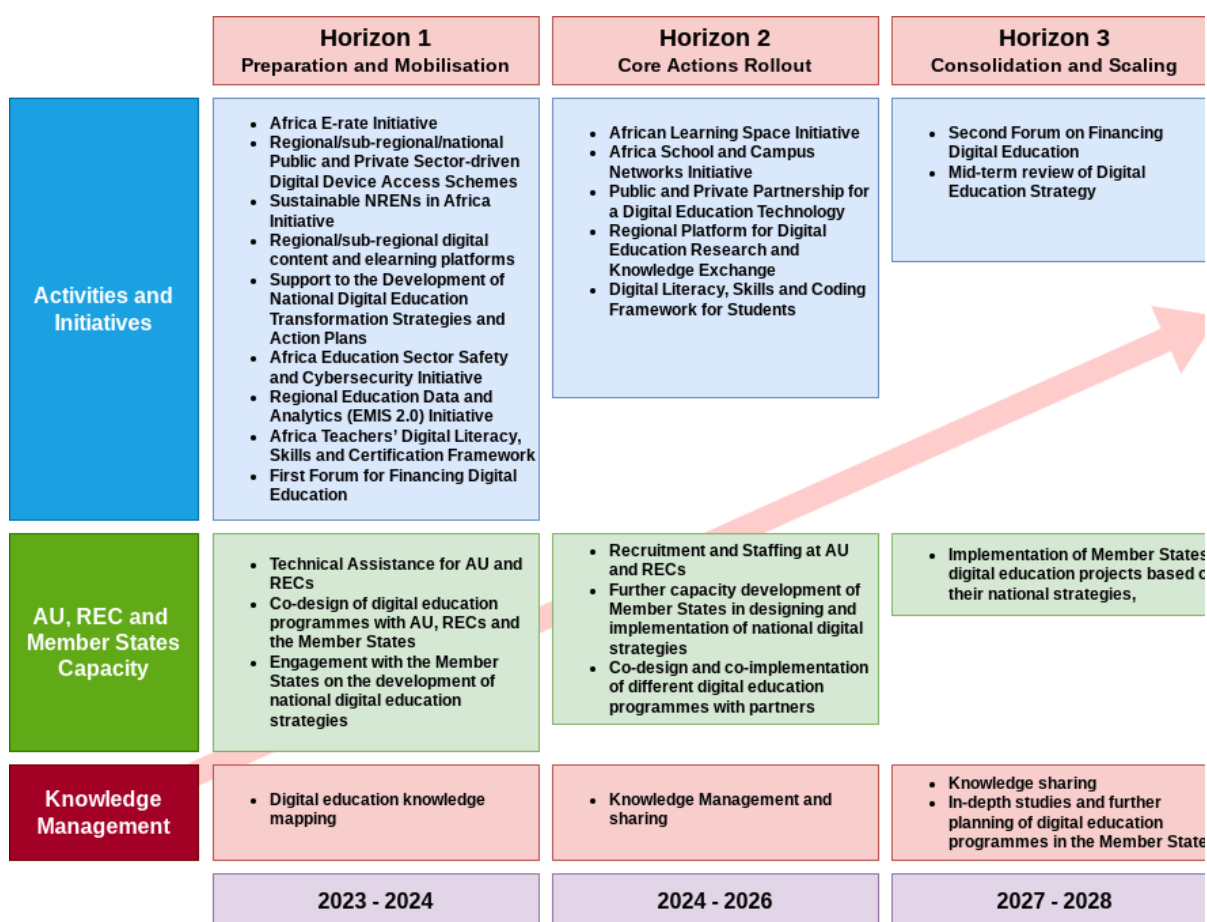


Figure 5: Overview of the Implementation Plan

Horizon 2, which will occur between 2024 and 2026, will roll out all the proposed strategic actions in the Digital Education Strategy in coordination with RECs and development partners. Horizon 3 will commence in 2027. It will see the consolidation of all the initiatives. This stage will focus on the review lessons learned during the four years of implementing the strategy and mobilising additional resources.

The Implementation Plan also envisages improved capacity of AU, RECs and the Member States during these phases. At first, AU, RECs' and Member States' capacities will be built through technical assistance. Horizon 2 envisages that the AU and RECs engage permanent staff to support the Member States' efforts in different aspects of digital education and promote knowledge sharing. Horizon 3 foresees that the AU and RECs staff support Member States in the actual implementation of the different digital education programmes and measuring progress.

From a knowledge management perspective, the first phase will focus on identifying the core indicators for tracking digital education, mapping knowledge sources on digital education and building tools for disseminating data and information in this area. The AU will build on baseline information gathered during a situation analysis to design this Strategy and Implementation Plan, to assemble further data, analyse, update, manage and share knowledge on the digital education experiences of its Member States. Horizon 2 will add in-depth information on Member States' activities in formulating and implementing their national digital education strategies. It is also envisaged that the AU, Member States and researchers will use the knowledge gathered during the first two phases to generate insights on digital education.

## **7.2 Summary of Actions and Outcomes**

The summary of strategic objectives, actions, primary outcomes, target and indicative KPIs, schedule, cost and partners for financing the different aspects of digital education are summarised in Appendix A. The Digital education Strategy and Implementation Plan proposes a requirement for US\$60 million to enable the AU and its partners to launch and implement regional programmes in digital education in coordination with its Member States. The AU will invest in and work with all partners to mobilise financing, technical assistance, data and knowledge for the different aspects of digital education. It will mobilise its Member States' efforts through well-articulated digital strategies. It will accelerate its knowledge management and sharing, which will serve as a basis for engagement and monitoring progress.

## **7.3 Monitoring, Evaluation and Learning**

The Digital Education Strategy and Implementation Plan emphasises the importance of evidence-based digital education in Africa. Strategic Objective 6 stresses the need to gather data, track progress, and generate insight on the link between investment in digital and the access, equity, affordability, relevance, and learning outcome challenges in education in Africa. The AU will draw on existing baseline data on digital education to track progress. It will partner with universities and research institutions (e.g., centres of excellence in digital education) to develop indicators and promote studies on different themes of digital education.

National digital education strategies are also expected to put a significant emphasis on evidence-based investment in digital education. Every national strategy is expected to have a monitoring and evaluation framework. The monitoring and evaluation data will be harmonised regionally to facilitate comparison across the countries. In addition, data and research from national and regional levels will be gathered and exchanged through the proposed regional

digital education research exchange platform to track progress and adjust programmes and strategies on an ongoing basis.

Monitoring, evaluation and learning of the Digital Education Strategy will be assured further by:

- i. Developing indicators to monitor the progress of Member States in all priority areas of digital education shown in Figure 1.
- ii. Integrating and monitoring and evaluation in the implementation of all the actions outlined in this Strategy and Implementation Plan.
- iii. Conducting a midterm review of the Digital Education Strategy and Implementation Plan in 2025 to evaluate progress and refine the different tasks in alignment with Member States' needs and technological progress.
- iv. Mapping, managing and sharing knowledge on digital education. Building on data gathered for the situation analysis, the African Union will update, maintain, and share knowledge on digital education to track progress on annual levels.

Based on data and the above, the AU will establish a web platform with a dashboard that shows progress in digital education across its Member States.

## 8. CONCLUSION

The technology-driven change impacts every aspect of education—teaching, learning, research, assessment and administration and also what needs to be taught: basic digital competencies and advanced digital skills. The COVID-19 crisis has shown that the impact of technology can be felt even in the remotest part of Africa. It has also revealed that failing to support technology integration in education means failing to prepare for the future.

When carefully applied, digital technologies can potentially impact learning by reducing the low access to and high cost of education. In addition, they can play catalytic roles in reducing the disparity between boys and girls and low level of learning outcomes, exacerbated by a limited number of qualified teachers. Digital literacy and skills will also impact youth employability, contributing to achieving the AU Agenda 2063 goals.

The AU Digital Strategy and Implementation Plan outlines recommendations for accelerating the African digital education ecosystem in the region over the next five years. The recommendations are intended to be carried out over three horizons—beginning with creating the foundations, including communication and advocacy of digital education, building the capacities of AU and RECs, developing Member States' capacities in articulating and implementing national digital education strategies, and mobilising resources.

The Digital Education Strategy and Implementation Plan proposes 14 regional actions grouped around eight building blocks. It advocates for the design and implementation of national digital education strategies that respond to the different contexts of Member States with attention to—infrastructure, learning content, data and analytics, innovation and entrepreneurship, research, teachers' digital literacy and skills, students' digital literacy and skills and improvement of application and systems. Further, it stresses that digital education's success depends on innovative leadership at all levels, a shared forward-looking vision for digital education, partnerships and collaboration between Member States and development partners in mobilising technical and financing resources to bring about the desired optimal impact. Digital education must pay particular attention to inclusion issues, especially to the empowerment of girls, children and adults with disabilities and those affected by conflicts and natural disasters.

Financing and evidence-based policymaking are the principal enablers for digital education. The AU Digital Education Strategy and Implementation Plan foresee the requirement for US\$60 million over five years to implement different programmes discussed in this document at regional levels, which will serve as a catalyst for further resources mobilisation and actions at national levels.

## 9. APPENDICES



## APPENDIX A: IMPLEMENTATION PLAN

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
Building Foundations for Digital Education – digital technologies for teaching, learning, research and administration	Promote an Enabling Infrastructure for Digital Education	<b>Africa Broadband Network Acceleration and E-rate Initiative</b> <ul style="list-style-type: none"> <li>Study broadband availability, connectivity models, bandwidth cost, prepare policy brief, raise awareness on increasing broadband and reducing the high cost of connectivity to education, and share the experience.</li> </ul>	<ul style="list-style-type: none"> <li>Reduced cost</li> <li>Increased demand and use of digital education,</li> <li>Increased awareness of bandwidth cost</li> </ul>	Cost lowered below \$25 per Mbps/month in all countries by 2027.	2023-2024
		<b>African Learning Space Initiative</b> <ul style="list-style-type: none"> <li>Develop an advocacy paper on the learning space for competency based and blended learning</li> <li>Regional learning space design workshops and contest</li> </ul>	<ul style="list-style-type: none"> <li>Modernisation of learning space</li> <li>Resources reallocation</li> <li>Support for a new mode of education – competency- based learning, blended learning</li> </ul>	Half of the buildings meet minimum learning space guidelines by 2027	2024-2028
		<b>Public and Private Sector-driven Digital Device Access Promotion Schemes</b> <ul style="list-style-type: none"> <li>Estimate cost of devices and outline access, local production and maintenance issues including potential e-waste,</li> <li>Devise devices access schemes that involve private sector, development partners and parents and various strategies including subsidies, local device production, etc.</li> <li>Raise awareness</li> <li>Forge partnerships</li> </ul>	<ul style="list-style-type: none"> <li>Availability of devices</li> <li>Availability of assistive technology tools</li> <li>Knowledge shared on devices schemes, maintenance standards</li> </ul>	Devices will be available for 50% of students and 100% of teachers by 2030 Assistive devices available for 50% of students in 2030	2023-2028

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
		<ul style="list-style-type: none"> <li>Establish an assistive technology fund</li> </ul>			
		<p><b>Sustainable NRENs in Africa Initiative</b></p> <ul style="list-style-type: none"> <li>Develop NREN roadmap and business plans</li> <li>Support new and fledging NRENs</li> <li>Promote e-research infrastructure</li> <li>Promote platforms for an exchange experience</li> </ul>	<ul style="list-style-type: none"> <li>NRENs developed and strengthened across Africa</li> <li>E-research infrastructure accelerated</li> </ul>	Sustainable NRENs by 2027	2023-2027
		<p><b>Africa School and Campus Network Initiative</b></p> <ul style="list-style-type: none"> <li>Create academia and private sector-led platform for the design of school and campus networks, and</li> <li>Share best practices and guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>Well-designed school network</li> <li>Africa campus network platform</li> </ul>	At least half of the school networks will be designed based on service ready architecture by 2030	2024-2028
	Stimulate the Development of Curriculum-aligned Digital Content, E-assessment and E-learning platforms	<p><b>Regional Digital Content, E-assessment and E-learning Platforms</b></p> <ul style="list-style-type: none"> <li>Conduct assessment on e-learning content and e-assessment platforms</li> <li>Establish guidelines on e-learning</li> <li>Train and motivate teachers</li> <li>Curate and organise curriculum-aligned resources</li> <li>Accelerate distance, hybrid and blended form of learning</li> <li>Create national and regional platform for sharing content, e-learning and e-assessment experience</li> </ul>	<ul style="list-style-type: none"> <li>Wider availability of curriculum-aligned content</li> <li>Experience and resource sharing on e-learning content, e-assessment and integrated e-learning platforms</li> <li>Reduced cost of access to online content</li> </ul>	<p>Integrated high quality online learning platforms for students and teachers for basic education in all AU Member States by 2025 from the low quality or non-existent e-learning solutions in 80% of countries in 2022.</p> <p>At least three regional platforms for exchange of online learning content. E-assessment and e-</p>	2023-2025

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
				learning platforms by 2025 from no platform in 2022	
	Expand AU Member States' Capacities in the Design and implementation of National Digital Education Strategies, Policies, Legislations and Guidelines	<b>Support for the Development of National Digital Education Transformation Strategies and Action Plans</b> <ul style="list-style-type: none"> <li>Support countries' effort to design digital education strategies and provide technical assistance</li> <li>Share experience in the developing national digital strategies</li> </ul>	<ul style="list-style-type: none"> <li>Digital education is based on articulated strategies and action plans</li> </ul>	All Member States develop their national digital education strategies and action plans by 2024	2023-2025
		<b>Africa Education Sector Safety and Cybersecurity Initiative</b> <ul style="list-style-type: none"> <li>Conduct in-depth review of cyber safety awareness in education</li> <li>Conduct a full review of cybersecurity awareness in education</li> <li>Develop guidelines on cybersecurity and cyber safety in education in alignment with regional and national guidelines, policies and regulation</li> <li>Raise awareness on cyber safety and data privacy</li> <li>Support multifaceted initiatives for raising awareness on cybersecurity and cyber safety</li> </ul>	<ul style="list-style-type: none"> <li>Regional guidelines on cyber safety and data privacy</li> <li>Awareness on cyber safety and privacy</li> <li>Guidelines and experience sharing on cybersecurity in education in Africa</li> <li>Increase investment in cybersecurity in education</li> </ul>	Regional and national cybersecurity and cyber safety guidelines followed by at least 50% of education institutions by 2027	2023-2025
	Effective Data	<b>Regional Education Data and Analytics</b>	<ul style="list-style-type: none"> <li>EMIS 2.0 architecture in</li> </ul>	At least half of the	2023-2027

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
	Management and Analytics for Education	<p><b>(EMIS 2.0) Initiative</b></p> <ul style="list-style-type: none"> <li>• Conduct review of education data and analytics situation, including school, TVET and University-based information systems</li> <li>• Develop EMIS 2.0 framework</li> <li>• Mobilise support</li> </ul>	<ul style="list-style-type: none"> <li>• place</li> <li>• Support for digital education powered data and analytics mobilised</li> </ul>	countries graduate from current data systems to data and analytics based on granular data powered by unique IDs, data models (EMIS 2.0) by 2027	
	Promote EdTech Entrepreneurship and Innovation	<p><b>Public and Private Partnership for a Digital Education Technology</b></p> <ul style="list-style-type: none"> <li>• Assess EdTech entrepreneurship and EdTech training</li> <li>• Review potential collaboration between African EdTech/universities with their peers worldwide and initiate joint programmes</li> </ul>	<ul style="list-style-type: none"> <li>• Improved collaboration between African EdTech/Universities and their peers worldwide on solving education challenges</li> <li>• Increased competitiveness of EdTech sector in Africa</li> </ul>	<p>At least ten enterprises delivering integrated solutions for education in all countries by 2027</p> <p>Revised EdTech curriculum informed by global practices in at least half of the African countries by 2025</p>	2024-2027
	Facilitate Research, Cooperation and Learning in Digital Education	<p><b>Regional Platform for Digital Education Research and Knowledge Exchange</b></p> <ul style="list-style-type: none"> <li>• A systematic review of evidence-based digital education in Africa</li> <li>• Funding for research on digital education</li> <li>• Establishing platforms for collaboration on evidence-based digital education</li> </ul>	<ul style="list-style-type: none"> <li>• Increased understanding of current research and gaps in digital education</li> <li>• A platform for the exchange of experience and collaboration on evidence-based digital education is created and promoted</li> </ul>	<p>A systematic review published by 2024</p> <p>A platform for exchange of evidence on digital education created by 2025</p>	2024-2027
Digital literacy and skills	Promote digital literacy and skills of Teachers	<b>Africa teachers' digital literacy, skills and certification framework</b>	<ul style="list-style-type: none"> <li>• Understanding of teachers' digital literacy</li> </ul>	All AU Member States adopt and implement	2023-2024

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
		<ul style="list-style-type: none"> <li>Assessment of teachers' digital literacy and skills gap</li> <li>Review of the adaptation of the UNESCO ICT-CFT or DigiCompEdu competency frameworks for teachers and development and implementation of teachers' digital literacy and skills competency framework for Africa</li> <li>Review certification scheme for teachers' digital literacy and skills,</li> <li>Implement an African Certificate for Teachers Digital Education</li> </ul>	<ul style="list-style-type: none"> <li>and skills training gaps</li> <li>Publication and use of African teachers' digital skill competency framework</li> <li>Teachers are certified based on African Certificate for Teachers Digital Education</li> </ul>	<p>teachers' digital literacy and skills competency framework by 2024</p> <p>AU Members adopt African Certificate for Digital Education Teachers by 2026</p>	
	Promote digital literacy and skills of Students, Community and Leaders	<p><b>Digital skills for students, community and leaders</b></p> <ul style="list-style-type: none"> <li>Review and adapt the competency framework for students' digital literacy and skills.</li> <li>Review and implement digital literacy and skills for communities and leaders.</li> <li>Develop guidelines for skills at TVET and higher education in close alignment with market and industry demands.</li> <li>Stimulate inclusive coding in Africa</li> </ul>	<ul style="list-style-type: none"> <li>African students' digital literacy and skills competency framework published and adopted</li> <li>Education leaders and community receive digital literacy and skills</li> <li>Job related digital skills are developed at TVET and higher education levels</li> <li>Inclusive coding promoted at education levels</li> </ul>	<p>At least half of the AU Member States adopt and implement digital competency frameworks and guidelines for students' digital literacy and skills.</p> <p>Increase in the number of coders (including girls and students with disabilities) by at least 10% on an annual basis in all African countries.</p>	2024-2027
Financing	Mobilise Resources for Bolstering Digital Education	<p><b>Forums for Financing Digital Education</b></p> <ul style="list-style-type: none"> <li>Develop promotional materials and proposals for funding digital education</li> </ul>	<ul style="list-style-type: none"> <li>AU Digital Education Strategy and Implementation Plan</li> </ul>	At least 50% of the AU Digital Education Strategy funded by 2024.	2022/2023 and 2025/2026

Focus Areas	Strategic Objectives	Strategic Actions and Tasks	Outcomes	Indicative Target(s) and KPI(s)	Timeline
		<ul style="list-style-type: none"> <li>• Organise two forums on financing digital education in Africa (2022/2023 and 2025/2026)</li> <li>• Encourage private sector participation in financing digital education</li> </ul>	<ul style="list-style-type: none"> <li>• funded</li> <li>• Financial and technical resources are mobilised for priority digital education projects in the Member States.</li> </ul>		

## APPENDIX B: INTEGRATION OF AI IN THE DIGITAL EDUCATION STRATEGY AND IMPLEMENTATION PLAN

Artificial intelligence is seen as an emerging technology, virtual reality, Augmented Reality, IoT, blockchain, robotics, etc. These frontier technologies are expected to enhance Africa's learning, teaching, research, and education management. The Digital Education Strategy considers three essential themes of AI in education namely learning with AI, learning about AI and preparing for AI.

- i. **Learning with AI**—the benefits of AI to improve educational processes in the classroom and at the system level. AI applications in education can be grouped into:
  - **Student associated solutions:** AI is increasingly being used to curate learning content across platforms based on analyses of learners' personalised needs and level of study. AI is becoming an integral part of the Intelligent Tutoring Systems (ITS) that tailor and presents learning content based on learners' ability (personalised learning pathways). Artificial intelligence powers chatbots that answer specific questions and provide guidance. AI can also be used in language and reading solutions to facilitate better reading, vocabulary and pronunciation. There are also numerous potential applications for assisting students with disabilities. Examples include voice assistants enabling students with literacy difficulties to search for books using only voice commands, AI-powered screening tools that can help in the early detection of dyslexia, and AI and augmented reality applications that can help children with hearing challenges read by translating texts into sign languages.
  - **Teachers related solutions:** AI apps can help automate routine teacher tasks such as taking attendance, marking assignments and answering the same questions repeatedly. In addition, there is substantive AI potential for automating learning assessment—allowing students to show their learning achievement playfully and engagingly or randomising, tailoring questions to students' different abilities. AI can also help in automating feedback on written assignments or detecting plagiarism.
  - **Institutions-related solutions** include AI-powered scheduling systems for timetables and examinations, managing time and room changes, etc. Based on longitudinal datasets, AI systems also promise to improve early warning of students' dropouts.
- ii. **Learning about AI- preparing Students, Teachers and Society for the AI world**—the second important aspect of AI in education is the development of skills of students, teachers and society to learn, teach, and live in the AI-powered environment, respectively. AI skill sets are critical for society to live in an increasing AI world, for students to master AI applications and for engineers to develop new applications and solutions. Skills and innovation in the digital era require that students and society be aware of AI's potential opportunities and challenges.
- iii. **Preparing for AI- ethical and Trustworthiness Issues of AI.** The third theme concerns



the ethical aspect of AI that should be reinforced when AI is applied in education. AI raises several policies and regulatory challenges ranging from data governance, algorithmic discrimination, attribution of responsibility and liability in decisions taken by AI systems to the use of AI for content personalisation online, including its implications for access to information, freedom of expression and privacy. Other regulatory challenges include intellectual property rights issues, including ownership of content generated by AI and the potential use of AI for moderation and curation of digital content, including content deemed illegal or potentially harmful. Automatic decisions or suggestions that AI makes will likely become human decisions that can impact students' and teachers' lives. Furthermore, biases that are built-in AI can lead to decisions that can affect specific students (e.g., girls, children with disabilities, minorities) or teachers—for example; AI could be used to support admission decisions, or to identify the type of support, including financial support, for learners. Thus, there is a need to ensure that AI systems serve human-centred values and protect and secure personal data.

**AI Readiness**— It should also be noted that AI uptake in Africa is still nascent due to the limitation of the necessary infrastructure, data to train AI solutions and AI skillsets. Only a few countries (e.g., Botswana, Ethiopia, Egypt, Kenya, Mauritius, Morocco, Nigeria, Rwanda, South Africa, and Tunisia) have ongoing AI programmes. Multiple challenges ranging from lack of skills and infrastructure, fragmented research landscape, and trustworthiness of AI to limited access to funding constrain its development. Data is an essential determinant for the development of AI. Access to data is essential for training algorithms and their usefulness in large scale applications, but such data are not readily available in Africa. The digital education strategy considers this low level of AI readiness.

AI has been mainstreamed in the Digital Education Strategy and Implementation Plan. Specific sections where AI has been highlighted include:

- **Ethical considerations**—AI's ethical and trustworthiness aspects are fully integrated into the Action 8—Africa Education Sector Safety and Cybersecurity Initiative. This Action proposes adopting policies and regulations that consider AI ethical issues ranging from data governance, algorithmic discrimination, attribution of responsibility and liability in decisions taken by AI systems to data privacy and security.
- **AI application in data and analytics**—AI is an essential tool for data and analytics in education, especially in the transition of Education Management Information Systems (EMIS) from the current headcount to an integrated system that measures equity and learning outcomes. Action 9 proposes the integration of AI in future EMIS to support the analysis of equitable, inclusive, open and personalised education.
- **EdTech Entrepreneurs' adoption of AI**—the EdTech enterprise in Africa is gradually adopting AI in their solutions, especially in tutoring systems. Action 10 emphasises the need for further efforts to foster EdTech enterprises' participation in designing and implementing AI-enhanced educational applications.
- **Research on the implication of digital education**—The AI dimension has been integrated into the research and evidence aspect of digital education. Action 11 emphasises the need for building an evidence base for monitoring the integration of

AI in education and analysing its implication on learning practices and outcomes.

- **Digital Literacy, Skills and Certification for Teachers**—Action 12 emphasises the integration of AI issues into the digital literacy, skills and certification of teachers, e.g., ensuring that Teachers' Digital Literacy, Skills and Certification Framework includes a module on AI for teaching, assessment, research and learning.
- **Digital Literacy, Skills and Coding for Students**—AI is fully integrated into students' digital skills. Action 13 proposes full integration of AI in the curriculum across the education sector, including in TVET and the promotion of advanced AI skills and research in higher education to foster local AI talent.

