

Digital transformation of TVET and skills development systems in Africa

2022



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State of play and prospects

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List of abbreviations and acronyms

4IR	Fourth industrial revolution
ADEA	Association for the Development of Education in Africa
ADSL	Asymmetric Digital Subscriber Line, a type of digital subscriber line technology
AFD	Agence Française de Développement
AMU	Arab Maghreb Union
ARCEP	Autorité de Régulation des Communications Electroniques et des Postes
AU	African Union
BTP	Brevet de technicien professionnel
BTS	Higher technician diploma (Brevet de Technicien Supérieur)
CAP	Certificate of professional competence (Certificat d'Aptitude Professionnelle)
CBA	Competency-based assessment
CBDC	Central bank digital currency
CBT	Competency-based training
CC	Certificate of competence
CENAFFIF	National Centre for Training of Trainers and Training Engineering
CFP	Vocational training centre (Centre de Formation Professionnelle)
CFTP	Vocational and technical training centre (Centre de Formation Technique et Professionnelle)
CNFCPP	National Centre for Continuing Education and Professional Development
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EOT	Open School for Workers
ESP	Education Sector Plan
FGN	Federal Government of Nigeria
FMoCDE	Federal Ministry of Communications and Digital Economy
FONAJ	National Youth Support Fund
FONAP	National Support Fund for Vocational Training
G2B	Government-to-business services
G2C	Government-to-citizen services
GIZ	Gesellschaft für International Zusammenarbeit
GDP	Gross Domestic Product
ICT	Information and Communication Technology
ICTE	Information and Communication Technology for Education
IDEAS	Development of Innovation and Efficiency in Skills Acquisition
IDI	ICT Development Index (ITU)
IIEP	UNESCO International Institute for Educational Planning
ILO	International Labour Organisation
INfor	National Training Institute for Public and Private TVET Personnel
IPST	Institut de Promotion Supérieure du Travail
ITU	International Telecommunication Union
LASTVEB	Lagos State Council for Technical and Vocational Education

MDNTDPT	Ministry of Digital Development, Digital Transformation, Posts, and Telecommunications
METFP	Ministry of Employment, Technical Education and Vocational Training
MEN	Ministry of National Education (Ministère de l'Éducation Nationale)
MESupRES	Ministry of Higher Education and Scientific Research
MFPTPEM	Ministry of Public Service, Labour, Employment Promotion and Modernization
MINICT	Rwandan Ministry of ICT
MPNTIC	Ministry of Posts, New Information, and Communication Technologies
NBTE	National Council for Technical Education
NCC	Nigerian Communications Commission
NESA	National Examination and School Inspection Authority
NPE	National Education Policy
NST	National Strategy for Transformation
OBSEFE	Observatory of Education, Training, and Employment
OECD	Organization for Cooperation and Development
SDG	Sustainable development goal
ODEL	Open-Distance E-Learning
ODFEL	Open, distance, flexible, and online learning
ONEQ	National Observatory of Employment and Qualifications
PIF TIC	Information and training point using ICT
PNEFP	National Technical Education and Vocational Training Policy
PRODIGY	Malagasy Digital Governance and Identity Management Project
PSE	Education Sector Plan
RTTI	Rwanda Trainers' Training Institute
TVET	Technical and Vocational Education and Training
UGD	Digital Governance Unit (Unité de Gouvernance Digitale)
UNESCO	United Nations Educational, Scientific, and Cultural Organization

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The cohesion of the team of investigators¹ has enabled them to make harmonious progress in a spirit of mutual support, and the team welcomes this collective spirit, which has enabled them to produce a national report in the first instance, and a summary report in the second, while remaining very faithful to local considerations. This is important since, in the field of training by and for ICT, **local activities and events play a considerable role in the development** not only of sophisticated technical tools, but also of the skills of the players to exploit them, to open up, and to benefit from quality training.

The study set out to consider the chain of responsibilities from both sides, i.e. both through **data collected from ministers and national officials responsible for the development of the country's digitalization**, particularly in the field of technical and vocational training, and through the **actors in the field in their training places**, where the pedagogical scripting of digitalization tools is the most essential skill of any trainer today. While skills in the use of digital techniques are necessary, even indispensable, they are not sufficient for the implementation of **didactic and pedagogical scenarios** for successful learning, both for young people and for adults in initial and continuing training.

This study has therefore not neglected any level of the technical and vocational education and training (TVET) development hierarchy, in order to ensure a bottom-up process relevant to the actual effectiveness of the implementation of the digital transformation of TVET.

For this reason, the authors of this study would like to thank the authorities in each of the countries who made it possible to open institutional doors, as well as the actors in the field, who are more often anonymous, for their contribution to the provision of information, reflections, and data concerning the feelings and reality of the digital development actions in TVET implemented in the various countries examined.

¹ Madagascar: Faly Herizo ANDRIAMBOLONIAINA, ICTE expert, and Marson RAHERIMANDIMBY, TVET expert; Nigeria: Maurice EKONG, combined expert; Rwanda: Benjamin HAKIZIMANA, ICTE expert, and Didier MUNEZERO, TVET expert; Chad: Djimramadji MINGUEYAMBAYE, combined expertise; Tunisia: Hadhami ABASSI, combined expertise.

Executive summary

African countries are currently experiencing a fourth industrial revolution, driven by rapid digital advances, but experienced in an uneven and unequal manner. The present study, carried out by SOFRECO at the request of the UNESCO International Institute for Educational Planning (IIEP), takes stock of the state of play in the digitalization of technical and vocational education and training (TVET), the demand for which has, until now, largely concerned manufacturing labour, but which is becoming pressing in the field of high digitalization. Indeed, the evolution of professions urgently requires high-level digital skills in training by, and for, digital technology. This study was conducted locally in one country of each of the five regional economic communities of Africa, namely: Madagascar, Nigeria, Rwanda, Chad, and Tunisia². It supports the Pan-African Initiative for the Digital Transition of TVET and Skills Development Systems, a vast international operation in Africa, supported by UNESCO among others³, to create, develop, and strengthen the digitalization of both initial and continuing technical and vocational training.

The aim is therefore to provide, as a reference point, an examination and analysis of the current state of play in these countries in terms of the development of digitalization, both regarding the use of technological tools by citizens and their technical, technological, and professional training.

Indeed, the cultural environment of a digitally-oriented country is decisive in the exponential development of the application of digital technology in society.

This report describes the measures taken in these five countries to provide the population with access not only to digital tools, but also to the skills that will enable everyone to use digital technology, not only for professional purposes but also in their daily lives. It is in this sense that this study focuses on digital training and on familiarizing individuals with digitalization so that it becomes a daily practice. It will identify the strengths and prospects on which international support may be based.

To carry out such a study, two main methodological processes were followed: on the one hand, direct interaction with the realities of the African continent through one country in each of the five regional economic communities, and, on the other hand, the use of a common data collection framework. It goes without saying that while each country is unique in itself, they each reflect general trends that reveal the strengths and weaknesses of the community to which they relate. The five representative countries are: Chad, Madagascar, Nigeria, Rwanda, and Tunisia. The field surveys were carried out by local experts who aimed to collect the most accurate information. Each country produced a report.

2 In alphabetical order of the country names in French, as per the original report.

3 UNESCO cooperates with the African Union and its Development Agency, through the Skills Initiative for Africa; the African Institute for Economic Development and Planning of the United Nations Economic Commission for Africa; the African Development Bank; the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); and the Institut de la Francophonie pour l'Éducation et la Formation

For this executive summary, we will look at five fundamental themes: governance, technical equipment, training, financing, and human resources. First, let us consider the level of internet coverage of these five countries in 2021:

Country	Internet coverage rate
Madagascar	51%
Tunisia	50%
Nigeria	41%
Rwanda	32%
Chad	12%

These rates clearly illustrate the poor internet coverage of African countries with major disparities often linked to: weakness of electrification networks, difficulty of technical and financial access, and inequalities between rural and urban areas.

The governance of these countries in terms of digitalization is undoubtedly proactive and progressing. Facilitating mechanisms have been created by the governments to accelerate its development: for example, in Tunisia, with clear support from the state, through the National Strategic Plan. The creation of a division dedicated to digital technologies within the Rwanda TVET board is one of the examples of digital integration in the governance of TVET identified by this study. In other words, governance is moving, no doubt at a very slow pace, but the beginning of this awareness and the proposal of structures are elements that can be built on.

In terms of technical equipment, the majority of inhabitants use smartphones but the use of computers is still very low

and passive. Timid advances in the use of software in everyday life, particularly in the areas of health and food, are being made in Nigeria, for example, and Rwanda initiated a Smart Rwanda Master Plan in 2015, which proposes the use of new technological equipment accompanied by training, leading to a diploma, and the opening up of the knowledge economy. However, in general, as the country studies highlight, where technical equipment is available to training entities, there is lack of skills to employ it, a lack of cultural use of it, and a lack of services to maintain the digital equipment, representing a structural gap that needs to be addressed. In Nigeria, a mapping of ICT infrastructure under the World Bank Development of Innovation and Efficiency in Skills Acquisition (IDEAS) project shows that about 75 per cent of colleges have no internet connectivity and 79 per cent have no servers.

The results of the country studies show that, in general, private training providers have better facilities and use them more efficiently. The supply of digital and digitally enhanced vocational education and technology (VET) programmes not only appears to be quantitatively and qualitatively insufficient, but is also not subject to an evaluation or quality assurance process, or to the scrutiny of a qualifications framework: only Rwanda speaks of measuring the quality of training. Such a picture leads to the observation that there are no curricula delivered through digital means.

Thus, the area that is most lacking is that of digital skills training, due to the absence of qualified personnel and a lack of suitable and equipped training facilities. The field of vocational and technical training has often been left to people with a low level of education, whereas

the contemporary labour market requires personnel highly qualified in the mobilization of digital production processes in all fields, including *soft skills*.

In Nigeria, the National Council for Technical Education (NBTE) is in discussion with the technology committee to establish a centre for the development of emerging ICT skills, as part of a proposal to use the IC3⁴ fast-track standard to build the capacity of instructors and students in NBTE-regulated TVET institutions⁵.

In order to make digital technology more prominent, public funding appears to be essential. In Madagascar, only 4 per cent of education expenditure is allocated to digital education, 17 per cent of which is in investments. Attempts at private-public partnerships are still too tentative and based on a shared interest, which can make the government dependent on the directions taken by the private sector. In these countries, employer involvement is largely unorganized and is hardly supported or encouraged. In other words, the funding for the development of youth training in digitalization comes from private bodies or non-governmental organizations (NGOs).

Human resources have been built up in recent years, both at national and regional levels, through a more decentralized organization. For example, Nigeria, through its federal structure, has provided all three levels (federal, regional, and local) with a strict roadmap with eight principles, aimed at regulating ICT development through strong infrastructure and autonomous content.

In Rwanda, TVET managers still lack digital skills. Only 50 per cent of trainers are trained in ICT, by the Rwanda Trainers' Training Institute (RTTI) with support from the ICDL programme and Microsoft.

In Madagascar, training on the use of Open-Distance E-Learning (ODEL) software was organized, with the support of the African Development Bank, to ensure continuity of training despite any barrier measures introduced due to the COVID-19 pandemic. Thus, 80 technical high school teachers and school officials benefited from training on (i) the creation of a digital teaching module, and (ii) putting the content produced online on a server of the Moodle application, physically installed at the information system department of the Ministry of Employment, Technical Education and Vocational Training (METFP).

From these observations, it is clear that digital development actions should be carried out in Africa. The problem, however, lies in the very effectiveness of the aid itself, which can be provided at several levels and in several areas. Simple actions can be launched as a first step, such as identifying good practice that is often isolated and not widely recognized. This could usefully be brought together through the three centres of excellence based in each country, which are conducive to development in the professional digital sector, and even more complex structural and training actions. This study identified a number of priority needs, such as: investment in ICT equipment and infrastructure (digital bandwidth, tools), training (certification framework), adaptation of training curricula in response

4 Internet Crime Complaint Center.

5 Telephone interviews with NBTE and face-to-face meetings with the NBTE consultant, 2021

to labour market demands, governance, and concerted development of public-private partnerships.

The African continent has potential and a tremendous hope in its youth: this brings with it the need to focus on training that

provides the digital skills that labour markets increasingly demand. The COVID-19 pandemic only reinforces the need to invest in digital education and training, a challenge that African governments can meet with the support of cooperation partners and the private sector.

Introduction

Increasing the digital allocation in Africa contributes to the pursuit of Sustainable Development Goal (SDG) 4 (to ensure equal access to quality education and promote lifelong learning opportunities for all) and, through a systemic approach, promotes the expansion of access to education through economies of scale and greater equity. Similarly, SDG 8 is targeted at increasing employment opportunities for young people by emphasizing the skills required by the fourth industrial revolution to promote decent work that contributes to the continent's economic growth. Furthermore, the rise of digital technology in the education-training sector due to the COVID-19 pandemic directly has an impact on African governments, as well as technical and financial cooperation partners, training providers, and the private sector.

The question is, how to benefit from the experiences of other countries, to skip some of the stages of development they experienced, and enable the installation, in a short space of time, of innovative pedagogies and mechanisms for the transversal integration of digital technology in technical and vocational training at all levels, whether in initial or continuing training. Training through and for digital technology is a key issue for the future of skills development in Africa. The systems that will be able to manage this transition better will be those that are more efficient in terms of matching the supply of skills with the needs of the labour market.

In order to know how to develop, it is necessary to understand a country's potential in the field, the obstacles that can be overcome, and the levers to enable change, both material and in terms of the representations of the inhabitants. In other words, before taking action, it is better to know the terrain in which the action will be implemented.

The report presented here is based on this approach and is a synthesis of local case studies from five countries, each located in one of the five regional economic communities on the African continent.

The report aims to invite reflection on the strengths and weaknesses of the development of technology in technical and vocational education and training (TVET). It represents the state of play and perspectives for the digital transformation of TVET, accompanied by the necessary development of related skills. It suggests some possible actions to support and assist development.

The report consists of six parts. The first part sets the international continental scene for the digitalization of TVET and current international projects; the second presents the objectives of this study; the third deals with the methodology for conducting this survey; the fourth questions the interregional context of digitalization of countries; the fifth focuses on the digitalization of TVET; and the sixth proposes perspectives and recommendations and ends with a conclusion.



Part 1

**International context:
key issues for a digital
transition of TVET and
skills development**

1.1 Recent initiatives to address the fourth industrial revolution

There is a large body of literature on the digitalization of technical and vocational learning⁶, but the last five years have seen an acceleration of a movement in which information and communication technology (ICT) are the triggers. ICT is no longer an isolated field but a support and a driving force for exponential development in the spheres of biology, physics, industrial technology, human resources, the conduct of labour markets, and, above all, in the demand for a new learning space. This situation challenges all the structures and skills of capacity building to create a broad ecosystem encompassing both technical and human skills. This points to a fundamental shift in the forms and media of learning, which is linked to a fundamental change in the skills of trainers and computer systems.

The 2020 report by the Association for the Development of Education in Africa (ADEA) “Rethinking the Role of Technical and Vocational Education and Training (TVET) in Future Work and Lifelong Learning, in Light of Digitalization and the Fourth Industrial Revolution (4IR)” paves the way for a substantial systemic approach to the digitalization of all areas of our lives (health, finance, education, trade, sports, etc.). The document points out the gap between this ambition and the real resources available, such as obsolete curricula, lack of appropriate training, and poor infrastructure. It specifies the absolute necessity of strong investment by governments.

The African Union’s Continental Strategy for Technical and Vocational Educational and Training (TVET) to Foster Youth Employment, developed in 2018, provides a guide for building the national, regional, and continental TVET ecosystem. However, the success of African economies depends to a large extent on the development of a skilled, technical, and innovative workforce, focused primarily on value-added manufacturing sectors. Indeed, industrialization is a real opportunity to change Africa’s crippling status as a heavy consumer of imported goods to a producer of manufactured goods, thereby generating jobs and wealth. The AU’s document provides a comprehensive framework for the design and development of national policies and strategies to strengthen TVET in order to increase labour productivity, employment and wealth creation, poverty reduction, and youth empowerment. It urges African member states and TVET practitioners to ‘*closely align their TVET policies and strategies (...) to bring about far-reaching reforms that meet the aspirations of youth by providing the skills needed for gainful employment*’.

Subsequently, the 2021 AU–Organization for Cooperation and Development (OECD) *Development Dynamics in Africa: Digital Transformation for Quality Jobs* annual report takes a more concrete look at the challenges of digital transformation of African economies and societies, with a specific focus on the role of digital skills. The report highlights how digital trans-

6 ILO–UNESCO (2020) *The digitalization of TVET and skills system*; African Union: *The Decade of Youth Training and Employment in Technology, Vocational and Entrepreneurship–2019–2028*

formation has already created new, high-quality jobs, helping to make African economies more resilient in the face of the global recession caused by the HIV pandemic.

Knowledge generation around the digital transition of skills development systems and TVET is not limited to published studies and research. Numerous exchange forums and online discussions have been

conducted in response to the pandemic by TVET stakeholders in Africa. To cite one, ADEA and its partners (the African Development Bank, Gesellschaft für International Zusammenarbeit [GIZ], and the World Bank) organized a high-level policy dialogue in July 2021 at the Virtual Forum to rethink the role of skills development in relation to the jobs of the future and lifelong learning, in light of the digitalization of our societies and the 4IR.

1.2 Continental framework set by the Pan-African Initiative

The Pan-African Initiative for the Digital Transformation of TVET and Skills Development Systems in Africa is presented in all these recent documents and projects, the key objective of which is to create an ecosystem for the transformation of TVET and, more generally, the development of the skills system for all Africans, culminating in the creation of centres of excellence that can facilitate digital transformation in each country and update advances in this area. This can only be achieved in strong and cohesive partnership, both technically and financially, with a central role for national governments and the digital private sector.

The initiative has a timetable and six objectives that guide the study presented in this report, namely, the need to have:

- a national TVET skills development network in all countries;
 - one day per year dedicated to ICT development;
 - a national centre of excellence in each country, capable of driving the transformation of skills in TVET in terms of digitalization;
 - a platform for governance and sharing of knowledge and experience in the digitalization of TVET;
 - a regular and periodic support mechanism (at a regional level) on the status of the development of digitalization in TVET.
- a pan-African programme for the development of skills systems (not the existence of closed, fragmented countries);

This study is part of this continent-wide initiative, with the objective of providing an overview of the current state of digitization of TVET and skills development systems in a sample of countries across the five regional economic communities.

1.3 What can be done to accelerate the transition in Africa?

The numerous studies carried out on the provision and use of new technologies in Africa provide universally recognized findings on the degree of adoption and reception of these new tools by the populations, as well as on their effects on the education and training systems. The common findings are:

- Significant progress has been made over the last 10 years in terms of geographical and social expansion, but in a heterogeneous and disparate way, both within each country and across the board. Concerted and operational planning is on the agenda but not yet fully implemented.
- An unequal divide between regions, urban and rural citizens, and men and women.
- Inequalities in access leading to frustration, blockages, and poor internet coverage in some countries.
- Lastly, the important dimension of the often-insufficient skills of users in relation to new technological methods.

These basic observations lead to think about providing special assistance and support. Indeed, if the progress of the digitalization of training in Africa is still too dependent on characteristics due, for example, to the geographical context (rural/urban), social or gender inequalities, or the skills mobilized, it is appropriate that support is concentrated on these parameters. By overcoming these challenges, digitization can develop rapidly and make up for the time lost in relation to the other continents. Identifying and supporting these counterexamples, of which there are many in Africa, would enable this ‘leapfrogging’



Part 2
Objectives of this study

2.1 General objective

This study contributes to the knowledge regarding the implementation of the major pan-African operation for the creation, development, or strengthening, depending on the country, of the digitalization in the technical and vocational training of all the African countries.

The main objective of this study is to provide an overview and perspective on the digital transformation of TVET and skills development systems in Africa. This will enable the study to propose some

recommendations and actions, the implementation of which by stakeholders will accelerate the digital transformation of TVET.

This snapshot of Africa's digitalization landscape in TVET will provide insights into the strengths and weaknesses of the process, including the fundamental dimension of the perception and reception of new technologies and their effects on people's mindsets, as an important aspect of development.

2.2 Specific objectives

The following specific objectives are assigned to this study:

- Take stock of the state of digital transformation of TVET and the skills development system in African countries, including its regulatory dimension.
- Highlight good practice, at national and regional level, that can be shared with other countries.
- Highlight issues that seem to be common to several countries.
- Clarify, through the analysis of good practice, potential roles and contributions that national and multinational digital companies could play in accelerating the digital transformation of TVET and skills development systems in African countries.
- Identify the priority needs of countries that require attention from the authorities and support from partners, particularly in terms of technical assistance in planning and managing this transition.
- Clarify, through the analysis of good practice, potential collaborative approaches between development partners (especially those at regional and continental levels) that would optimize the impact of the support and assistance provided to countries.
- Highlight relevant and operational recommendations to be implemented in the short and medium term by the states to (1) accelerate the digital transformation of TVET in the countries and (2) make this inevitable transformation an asset, and an opportunity, for better responses to economic and social demands.
- Identify and propose a ‘top three’ of national centres in each target country that could, under certain conditions, be considered as centres of excellence in digital transformation.
- Propose relevant and operational recommendations, to be implemented in the short and medium term by the development partners involved in the issue, to ensure better synergy and coherence in the multiple supports provided to states in response to the COVID-19.



Part 3
Methodology

3.1 Country selection

The technical proposal for this study included a number of criteria, including that of nominating, for each of the five regional economic communities, a country in which a case study would be carried out, one that could potentially serve as a basis for supporting the creation of national or regional centres of excellence in TVET digitalization. For this, the five countries selected had to have a relatively favourable context, such as having prior technical plans, a certain level of political will, substantial involvement with direct or indirect infrastructure, and have capacity to support the digital transformation of TVET.

The African continent is composed of five different regional economic communities:

- East African Community (EAC): 173 million people, with a current average internet penetration rate of 32 per cent thanks to improved fibre optic links, but with one country still struggling, Burundi.
- Economic Community of Central African States (ECCAS): 200 million inhabitants, with an internet penetration rate of 12 per cent; this low rate is linked to a low electrification rate (13 per cent).
- Economic Community of West African States (ECOWAS): 390 million inhabitants, with an internet penetration rate

of 41 per cent, and a vision to modernize the information and communication infrastructure network.

- Southern African Development Community (SADC): 345 million people, with an internet penetration rate of 51 per cent, with rapid expansion of mobile phone use for banking, advertising, or information services.
- Arab Maghreb Union (AMU): 101 million inhabitants, with an internet penetration rate of 50 per cent.

In each of these regional economic communities, a sufficiently representative country was selected, matching the above-mentioned criteria, and having one or two competent experts in the required field. These five countries are geographically spread across the African continent (see map in *Figure 1* with the selected countries in red). They are:

- for the EAC, Rwanda,
- for ECCAS, Chad,
- for ECOWAS, Nigeria,
- for SADC, Madagascar,
- for AMU, Tunisia.

3.2 Research methodology and process

Each national team carried out, as comprehensively as possible, a case study of the country concerned, with a view to presenting it to the regional community. To do this, it combined qualitative and quantitative data collection tools (documentary analysis, meetings with those directly or/and indirectly responsible for ICT in TVET, field observations, exchanges with learners in focus groups, etc.).

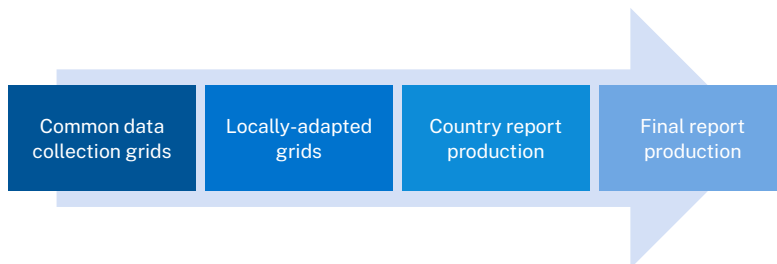
The following are examples of some of the elements (sources and indicators) that have been collected:

- Existing national programmes, curricula, and competency frameworks.
- Existing human resources management plans and tools.
- Existing inspection reports.
- Existing state reports of the national education system and studies on teaching issues.
- Penetration rates of mobile and internet equipment.
- Costs of technological equipment.
- Didactic classroom practices.
- Indicators of the use of ICT tools.
- Profiles and skills of the different services/institutions that can be mobilized.
- Staff/institutions involved in previous or similar projects.
- Inventories of available material resources and equipment.
- Financing mobilized (technical and financial partners).
- Partnership schemes and organization of roles within the project.
- Circulars and regulations (i.e. decree creating or conferring competences), and digital resources.
- Number of teachers/leaders covered by the network having encountered difficulties in accessing ICT resources already available and reasons.
- Percentage and profile of teachers/supervisors interested in increased use of ICT.

The implementation of this study was carried out in four stages:

1. Gathering all the experts to confirm the understanding of the objectives to be pursued, the data to be collected, and the methodological tools to do so. A cross-sectional grid was designed from this stage.

Figure 2 Steps in the implementation of the study



2. This cross-sectional grid was adapted locally, according to the respective configurations and modes of understanding of each country, but with generic cross-cutting elements.
3. A drafting process for each country, with the common plan presented above, allowing for the subsequent exploitation of the information collected. This stage produced five country reports.
4. The drafting of a final summary report based on the five country reports, drawing realistic comparisons that enhance national specificities and identify sensitive points for possible international support interventions in terms of training, technical equipment, and governance assistance.



Part 4
**The digital landscape
of sampled countries**

4.1 General status of countries in terms of digital equipment

Over the past decade, we have seen a rapid increase in internet coverage in African countries, largely due to the reduction in the cost of mobile connections, and an increase in the number of mobile devices in the population.

Despite the significant challenges ahead, progress in these two key areas has been rapid and promising.

The strong competition in the market for internet and mobile connection offers⁷ from local service providers is undoubtedly the reason for this expansion, as it increases the possibilities of using 3G, 4G, or 5G (third, fourth, and fifth generations of cellular technology) mobile networks in areas without fibre or ADSL technology⁸. It stimulates the expansion of digital use, including in everyday life. For example, in terms of internet access points, a large majority of Malagasy people connect from their mobile phones; only 20.86 per cent connect from a computer.

At this stage, the use of digital technologies in Africa is still in its infancy on a global scale, although its use is gradually spreading to many sectors, both in technology sectors, such as FinTech and remote payment services (mobile money services), high-tech, aggrotech, but also in non-technology sectors, such as small business and service provision,

fashion design, tourism, and catering. Smartphones and applications such as Facebook, Instagram, and WhatsApp, among others, are increasingly used to reach existing and potential customers.

In the FinTech industry, Nigeria has produced four ‘unicorns’⁹ to date, namely Interswitch, Flutterwave, Chipper Cash, and Opay. The country currently represents the largest mobile telecommunications market in Africa, based on rapid development after the auction of digital mobile licenses 20 years ago. The major players in the mobile telecommunications market in the country are MTN (73.5 million subscribers), Airtel (50.7 million subscribers), Globacom (50.1 million subscribers), and 9Mobile (12.9 million subscribers)¹⁰. According to the Nigerian Communications Commission (NCC), the market will serve 184 million mobile lines by December 2019, of which 126 million lines will be connected to the internet. But internet services in the country are expensive and unreliable, provided on 2G, 3G, and increasingly 4G mobile networks. 4G coverage is available to 37 per cent of the population, but download speeds are not competitive with countries in the same income bracket¹¹. NCC reports that the number of internet subscriptions in the country stood at 148.1 million in February 2021, representing 13 per cent year-on-year growth.

7 For example, the operator Telma has made an offer of unlimited access to Facebook, for 1GB of data transfers, available for one week at the price of 500 Ariary in local currency, the equivalent of USD 0.12

8 Asymmetric Digital Subscriber Line, a type of digital subscriber line technology

9 This term refers to a technology start-up with a valuation of at least one billion US dollars and a high growth potential.

10 <https://guardian.ng/news/telecoms-operators-market-share-drops-as-110m-lines-become-inactive/>

11 National Broad Band Plan 2020–2025

At the time of writing, only four countries on the African continent, besides Nigeria, have launched CBDCs (central bank digital currencies) with 14 other countries outside Africa, including South Korea and Sweden, in pilot phase¹². Nigerians are early adopters of the technology and had already embraced cryptocurrencies before they were banned by the country's Central Bank. Other victories of Nigeria's digitization project include the National Identity Number, a mobile digital identification, which recorded over 63 million registrations as of August 2021, up from 42 million in October 2020¹³; and the Bank Verification Number, which provides seamless validation and verification of bank customers' identities across multiple interoperable electronic platforms. Overall, the federal government's E-Government Master Plan and E-Government Interoperability Framework were launched in 2019, designed to 'use ICT to foster transparent governance and improve the quality and cost-effectiveness of public service delivery in Nigeria'¹⁴.

In Rwanda, in 2018, following the rollout of 4G LTE¹⁵ to all neighbourhoods in the country, other notable broadband initiatives started, such as the rollout of free Wi-Fi on buses and in public places. As of December 2018, 4G LTE technology had a geographical coverage of 94.2 per cent and reached 96.6 per cent of the population, as highlighted by the Rwanda Public Services and Regulatory Authority. Of the

total population, 47.7 per cent has access to the internet and 82.6 per cent of those subscribe to mobile phone services. The number of mobile money subscribers increased from 9,912,735 users in 2017 to 11,067,077 in 2018. Through the IREMBO platform (the government's online services portal), Rwandans can access 89 government services online via mobile devices and/or PCs. These services include: government-to-citizen (G2C), government-to-business (G2B) and government-to-government services. According to the Integrated Household Living Conditions Survey IV, computer literacy, a rate measuring digital literacy in the general population, has increased over the past three years from 5.3 per cent to 8.4 per cent, and has almost doubled from 6.5 per cent to 10.9 per cent in the younger cohort.

Nevertheless, again in Rwanda, the urban/rural divide is very pronounced, as more than a quarter (26 per cent) of all people living in urban areas report being computer literate as opposed to only 6.8 per cent of people living in rural areas.

In 2020, Rwanda had 4.12 million internet users out of a total population of 12.95 million or 32 per cent. The number of internet users increased by 806 thousand (+24 per cent) between 2020 and 2021. Internet penetration is increasing as a fast-growing market segment. It recorded continuous double-digit growth rates in

12 <https://www.france24.com/en/africa/20211025-nigeria-africa-s-largest-economy-launches-digital-currency-enaira>

13 <https://nairametrics.com/2021/09/16/poor-vulnerable-communities-remain-the-least-likely-to-have-national-id-africa-practice/>

14 Nigeria E-Government Interoperability Framework, FGN 2019 and Nigeria E-Government Master Plan, FGN 2019; DQL Ranking, 2021

15 Long-Term Evolution (LTE), is a standard for wireless broadband communication for mobile devices and data terminals,

2021, pushing the national penetration rate to 52 per cent. This figure indicates that the rate has increased more than threefold in just five years.

Chad is one of the countries making the least progress in the study sample: its coverage rate is 48 per cent for smartphone use and only 14 per cent for the internet, with an increase between 2019 and 2020 of 1 per cent. The fibre optic cable runs for 2,200 km, in a country with a surface area of 1,284,000 km², with persistent inequality between rural and urban areas and a high urban concentration in the capital N'Djamena.

While some countries are making rapid progress, others are tending to stagnate. For example, Tunisia was the first African country to connect to the internet in 1991, considerably before Nigeria, as the initiator and host of the World Summit on the Information Society in 2005¹⁶; it now ranks only 91st in the 2020 Network Readiness Index¹⁷. The World Bank published a report on the Tunisian digital economy in 2020¹⁸ highlighting the lack of maturity of almost all the foundations of this economy. Despite this, in Tunisia the ICT sector contributed 11 per cent of GDP in 2017 and provided more than 100,000

jobs in 1,600 specialized companies¹⁹. The major asset of the sector is the available, well-qualified, and inexpensive human resources. Indeed, 8000 new ICT engineers join the labour market every year, and for the same performance, a Tunisian engineer would cost his employer five to eight times less than his counterpart in Europe or even in sub-Saharan Africa²⁰. Taking advantage of this major competitive advantage, three types of companies (multinationals, Europe-oriented companies, such as the textile industry, and publishing companies) have set up or developed their activities in Tunisia, which in 2017 enabled the country to export one billion dinars²¹ worth of software and ICT services. There seems to be a gap between people with a strong capacity to develop internet uses and the general Tunisian population, where internet use is stagnating.

In addition to the three telephone operators, Tunisie Télécom, Ooredoo, and Orange, and the telemarketing companies, companies in the financial, industrial, and service sectors are increasingly involved in major digital transformation plans, requiring more and more equipment, software solutions, and human resources specialized in ICT.

16 International Telecommunication Union. 2005. World Summit on the Information Society (WSIS) <https://www.itu.int/net/wsis/index-fr.html>

17 Portulans Institute. 2021. *Network Readiness Index* <https://networkreadinessindex.org/wp-content/uploads/2020/12/Tunisia.pdf>.

18 World Bank Group. 2020. *Diagnosis of Tunisia's Digital Economy* <https://documents1.worldbank.org/curated/en/822451592422759317/pdf/Diagnostic-de-lEconomie-Numerique-de-la-Tunisie.pdf>

19 Deutsche Gesellschaft für Internationale Zusammenarbeit. 2020. Shaping Tunisia's digital transformation and creating jobs

20 Tanit Job. 2019. *Focus on ICT in Tunisia*. <https://www.tanitjobs.com/blog/134/zoom-sur-le-TIC-en-Tunisie.html/>; Web manager center. 2018. *The Tunisian exception in ICT*. <https://www.webmanagercenter.com/2018/03/28/417827/lexception-tunisienne-en-tic/>

21 Approximately 325 million USD.

As far as state support is concerned, the creation of three technology centres in El-Ghazala (Ariana), Sousse, and Sfax should be noted. In 2020, the El-Ghazala centre hosted some 79 companies, employing 2547 people. Cyber parks have also been created in the various governorates, housing nearly 200 companies and employing more than 680 people²².

In other words, for the five countries studied, internet coverage is relatively satisfactory with regard to mobile phones, with the exception of Chad. There is an inequality in

the development of digitalization between the leading sectors and those that are stagnant, the price of access is often too high, there is a territorial disparity with widespread digitalization in the urban areas to the detriment of the rural areas, and technical equipment is advancing slowly, with a speed that is still too low to encourage the population to use it. Despite the potential curve in terms of job creation and generation of wealth and economic growth that characterizes the digital sector, internet use is still unequally oriented towards the country's productive activities.

22 Ministry of Communication Technologies. 2020. *Companies located in cyber parks* <https://www.mtc.gov.tn/index.php?id=358&L=570>

4.2 Overview of the digital policy context

Digitalization of the countries studied, potentially represents a job-creating innovation. But, like all innovations, it has the capacity for ‘creative destruction’, i.e. it imposes, as Schumpeter emphasized²³, a new societal model, based on a large number of new activities and, therefore, many new jobs. The difficulty for politicians in this strategy lies in getting the population to accept and mobilize for this inevitable change.

These new jobs will obviously require new skills and, therefore, the intensive and massive development of new skills.

The Malagasy state is currently engaged in a process of macro-framing the general policy in accordance with the 13 presidential commitments known as ‘13 Velirano’ and according to the policy promoted by the Initiative for the Rise of Madagascar, declined in national development plan (Plan for the Rise of Madagascar), a challenge launched by the Government. The digital transformation of access to public services is part of the 11th Velirano commitment to modernize Madagascar and provide digital access for all. To this end, the Digital Governance Unit (UGD) was created as a national coordination body under the administrative supervision of the Presidency of the Republic and attached to the Ministry of Digital Development, Digital Transformation, Posts, and Telecommunications (MDNTDPT) for the technical and operational division.

The role of the UGD is to change the state’s vision of the digital transformation of governance, i.e. e-governance.

Therefore, no matter the sector of intervention, all actors in the field of digitalization, including first and foremost ministries and public bodies, the private sector, and technical and financial partners, must comply with this policy. Thus, on the national territory, any initiative in the field of digitalization must inform the MDNTDPT through the UGD. The aim is to standardize the data management system and interoperability. This approach does not seek to oppose any initiative already in place or being implemented, but rather recommends referring to the norms and standards established by this national digital governance platform, so that the government can better manage and provide policy and strategic support.

To reinforce its commitment, the government has adopted a new law, No. 021-2018 of 30 May 2018, on civil status, which establishes a unique identifier at birth. This initiative was supported by the World Bank within the framework of the Malagasy Digital Governance and Identity Management Project (PRODIGY).

In Nigeria, the Federal Ministry of Communications and Digital Economy (FMoCDE) has been mandated by the federal government to coordinate activities related to Nigeria’s digital transformation. To catalyse this objective, it has developed a National Digital Economy Policy and Strategy Framework 2020–2030. The ministry expects this policy to be adopted by all arms of government across the three tiers (federal, regional, and local), but, according to its IT director, the ministry ‘does not have the authority to execute’.

²³ Schumpeter, J. 1951/1990. *Capitalism, Socialism and Democracy*. Payot

According to the FMoCDE, the National Digital Economy Policy and Strategy has a roadmap based on eight principles to accelerate the development of a digital economy in Nigeria. These principles are:

- Regulation of development
- Literacy and digital skills
- Solid infrastructure
- Service infrastructure
- Soft infrastructure
- Development and promotion of digital services
- Digital society and emerging technologies
- Development and adoption of indigenous content

These eight principles were conceptualized to align with the federal government's Economic Recovery and Growth Plan²⁴, while simultaneously addressing the administration's priority areas in 'economic development, anti-corruption, and security'. In order to achieve its core objectives, the Federal Government of Nigeria (FGN) 'encourages' the 36 states, the Federal Capital Territory, and the 774 local government areas to 'cascade these policies and strategies'²⁵.

The Rwandan Ministry of ICT (MINICT) is tasked with addressing national priorities. To this end, it has developed a strategic plan that is the result of the country's efforts to harmonize, coordinate, and integrate all ICT initiatives in order to achieve the overall objectives of the National Strategy for Transformation

and Prosperity. Several stakeholders are active in the ICT sector with well-defined roles.

The Government of Chad's public policy on ICT is the exclusive responsibility of the Ministry of Posts, New Information, and Communication Technologies (MPNTIC) and the bodies under its supervision. Although it plays a central role in coordinating ICT activities, public policy in this area is carried out by the institutions under its supervision. The first is the Autorité de Régulation des Communications Electroniques et des Postes (ARCEP)²⁶, created by Law N°13/PR/2014 of 14 March 2014. ARCEP, replacing the Office Tchadien de Régulation des Télécommunications²⁷, has as its mission, among others, the regulation of electronic communications and posts and the regulation of the ICT sector. The ICT Development Agency was created by Law N°12/PR/2014 of 14 March 2014 for the development of ICT. Its mission is to coordinate the implementation of national ICT strategies and policies and to ensure the implementation of the universal ICT service in the national territory. Other structures also implement government policies in the ICT sector. This is the case of the National Agency for Computer Security and Electronic Certification, which works to improve the institutional environment. This agency, created by Law N°006/PR/2015, has as its main missions to ensure cybersecurity and the fight against cybercrime, to ensure the protection of personal data, and to monitor electronic transactions.

²⁴ Economic Recovery and Growth Plan 2017–2020

²⁵ National Digital Economy Policy and Strategy 2020–2030

²⁶ The regulatory authority for communications and postal services.

²⁷ Tchad regulatory office for telecommunications.

The Société Tchadienne des Postes et de l'Épargne²⁸ and the Société Tchadienne des Télécommunications²⁹, created respectively by Laws N°008/PR/98 and N°009/PR/98, are responsible for providing postal services and savings services for public goods and services in mobile and fixed telephony.

In 2011, the Tunisian State drew up a National Strategic Plan for the strengthening and acceleration of digitalization, which has since been continuously updated: from 'Tunisie Digitale 2018' it became 'Tunisie Digitale 2020', and then 'Tunisie Digitale 2016–2021'. These documents could not be translated into action despite substantial funds allocated amounting to more than 5.4 MDT. ICT is among the niches identified by the '2016 Industrial Strategy' as promising. The dematerialization of administrative processes in Tunisia began in the 1980s, with the creation of several computer applications. Despite a 'Smart Gov 2020' strategy aimed at 'integrating, opening up and centring the administration around

its users through digital appropriation³⁰, there is still a long way to go. The Ministry of Communication Technologies, under the supervision of the Presidency of the Government, is leading the digitalization project at national level and is preparing various national strategies in this area. The latest one covers the period 2021–2025.

All in all, each country has created central bodies to align digital development initiatives. These bodies are often under the authority of the president of the republic and under the supervision of one or more ministries, which has the advantage of avoiding the dispersal of initiatives, aid, and support. Different recovery plans are often drawn up as instruments for dialogue and negotiation with technical and financial partners. It may also be highlighted that, although these countries have an institutional framework dedicated to the development of ICT, these declarations of intent have not always been well implemented or communicated to inhabitants³¹.

28 Tchad society for postal services and savings.

29 Tchad society for telecommunications.

30 Presidency of the Tunisian Government. 2020. *Presentation of the Smart Gov 2020 strategic study* <http://fr.tunisie.gov.tn/101-pr%C3%A9sentation-g%C3%A9n%C3%A9rale-de-l-e-strat%C3%A9gie.htm>

31 Refer to the surveys of stakeholders who believe that there is no policy on ICT and learning.

4.3 Education, training, and guidance system

4.3.1 Education systems

All school systems in the five countries are based on the 6+3+3 formula (6+3+4 years in Chad), including Nigeria where compulsory school corresponds to three years of pre-primary, three years of primary, and three years of lower secondary. Frequently the final diploma, after three years of upper secondary education, is the baccalaureate through the general route. This is followed by higher education, either academic or technical-vocational.

Mostly, technical education starts after the nine years of basic school. However, programmes with some vocationalization are offered as early as Grade 4 for some students. The majority of students are therefore directed to TVET after the basic nine years, but at the time of transition to Grade 7, some students are directed to technical colleges for three years and may continue for three years in technical upper secondary.

In Madagascar, technical and vocational training provision operates, in most cases, with obsolete equipment and teaching materials and a non-updated curriculum. The relatively old training staff have not benefited from training in specialized pedagogical institutes, which often hinders the development of skills at the end of studies and especially at the time of hiring. Aware of this difficulty, companies and recruiting organizations often choose to train young recruits them-

selves, after hiring, to ensure better integration into the professional environment.

Vocational training in Tunisia takes place in specialized centres and allows students to obtain a certificate of competence (CC) in the professional field concerned, after two years of training and/or a certificate of professional aptitude (CAP) after the nine years of basic education, and vocational training in one of various sectors (agriculture, industry, services, tourism, military, etc.). Learners who have completed the second year of secondary education, or who have obtained the CAP, can follow vocational training to obtain a *Brevet de Technicien Professionnel (BTP)*³² in various sectors (agriculture, industry, services, tourism, military, etc.) and then extend their vocational training to obtain a BTS in these same sectors.

The school systems of several countries have been forced to evolve in line with their host populations, particularly in terms of professional integration. Indeed, many of these countries are faced with a massive influx of refugees from internal conflicts in their countries, or from elsewhere. This has been the case in Rwanda, where TVET schools have been created specifically to accommodate refugees from the Democratic Republic of Congo, Burundi, Libya, and Afghanistan. These schools may be difficult to integrate into the existing system for a number

³² In the absence of an internationally-recognised English-French glossary of TVET qualifications and titles such as diplomas and certificates for vocational education (ISCED levels 2 and 3) for the case studies of Bénin, Madagascar and Sénégal this study retains the original title in French language, adding in footnotes a brief explanation in English. BTS is a title delivered to highly-skilled technicians.

of reasons, including curriculum and language of training.

It can be seen, albeit regrettably, that vocational sections are often occupied by students who have not succeeded in the academic sector. For example, in Tunisia, vocational sections are considered a way out for pupils who have experienced successive school failures. In addi-

tion to the fact that the school system is divided into levels and tiers, there is also an implicit division between the golden routes reserved for general education and the 'back-up' routes of the technical-vocational routes. It is to be hoped that the rise of ICT will help to attenuate this division and highlight vocations geared towards high-level digitalization.



Part 5
Digitalization of TVET

This part of the report constitutes the very pillar of the reflection for any digitalization of TVET as it considers the essential elements that must come together for the maximum development of the digitalization of TVET. These elements depend on national policy initiatives, on the forces already at work, such as the current degree of digitalization of TVET, and on the ways in which these technological facilities are used in the training process, particularly in pedagogy.

5.1 National responsibilities of TVET in relation to its digitalization

In Madagascar, for TVET, any digital transformation initiative must comply with the National Digital Transformation Policy norms and standards established by the UGD. In the framework of the implementation of the PRODIGY project, it is sufficient to follow the policy, strategic, and technical recommendations of the UGD to fully benefit from government support. A digitalization programme is established in the Education Sector Plan (ESP) 2018–2022 through the creation of information platforms on jobs and training, especially for staff and trainers.

The Malagasy Directorate of Technical and Vocational Education is responsible for digitalization in public and private TVET organization (administrative and pedagogical parts) in conjunction with the Directorate of Information System. The digitalization of the education system's information system in Madagascar was included in the PSE 2018–2022, initiated by the Ministry of National Education (MEN), Higher Education and Scientific Research (MESupRES), and Employment, Technical Education, and Vocational Training (METFP) in 2017. At the time of the elaboration of the PSE, employment was integrated into MEETFP, but currently, this department is attached to the Ministry of Public Service including the National Observatory of Employment and Training. In Programme 3 of the PSE, a relevant and accessible information system on employment and TVET/Continuous Professional Development aims at creating (i) a digital information platform at national level and (ii) regional and local networks of TVET institutions.

In Nigeria, at the strategic level, NBTE is in discussions with the Technology Committee to establish a centre for the development of emerging ICT skills, as part of a proposal to use the IC3 accelerated standard to build the capacity of instructors and students in NBTE-regulated TVET institutions³³. Apart from this commitment, most of those consulted stated that they were not aware of any policy for the digitalization of TVET and the skills development system. This leads to the conclusion that no coordinated digital transformation policy and strategy for TVET and skills development seems visible to those who should benefit from it.

The Smart Rwanda Master Plan was approved by the Government Council on 3 November 2015. This knowledge-economy-oriented strategic plan focuses on digital transformation in seven key sectors which are: governance, education, health, finance, gender and youth inclusion, trade and industry, and agriculture. Higher education has made a commitment by introducing ICT-based courses for the development of students' skills. While still very limited, these include courses such as: software development and engineering, mobile computing and distribution systems, forensic information technology and cybercrime, and networking and digital electronics.

To meet Chad's ICT capacity-building needs, the government, through Ordinance N°005/PR/2015 of 2 March 2015, created the Ecole Nationale Supérieure des Technologies de l'Information et des Communications³⁴ which is a public insti-

³³ Telephone interviews with NBTE and face-to-face Meetings with the NBTE Consultant, 2021

³⁴ National school for ICT

tute of higher education. Its main mission is the development of human capital, in particular by ensuring initial and continuous training in ICT, and the coordination of applied research activities. The school is currently located in three cities, namely N'Djamena, Sarh, and Amdjarass.

Although digitalization initiatives exist in Chad, they are very poorly known in the public TVET system; on the other hand, in private VET centres in N'Djamena, digitalization of training activities is quite possible. In this country, in 2021, the implementation of digital skills development systems remains disruptive in a very traditional education system, that is very weakened by very disruptive socio-political hazards. The various TVET stakeholders we met recognise the importance of digitalization but deplore the great challenge facing trainers, supervisors, managers, and administrators. This challenge is largely due to the lack of digital equipment in the training centres and the lack of mastery of its use by those mentioned.

Article 4 of Tunisian Law No. 2008–10 of 11 February 2008³⁵, for its part, governs vocational training and specifies that,

for the education sector, in particular technical education, the National Centre for Educational Technology is responsible for the digitalization dossier (internet providers, infrastructure, educational software platform providers, etc.). The National Maintenance Centre, also under the supervision of the Ministry of Education, ensures the maintenance of computer equipment in administrations and educational establishments through points of presence in the 26 regional education delegations³⁶. Training programmes are developed and updated by the Ministry's Directorate-General for Programmes and Continuing Education. The Directorate-General for Informatics and Electronic Administration and the Directorate-General for Studies, Planning and Information Systems in the Ministry are also contributing to the digital transformation project. The National Council for Training and Skills Development is a new structure created in August 2020, with a similar mission to harmonize interventions in the field of training. With regards to the actual equipment of schools, there are many inequalities and a more detailed study should be carried out, with private education appearing to be better equipped.

35 Ministry of Employment and Vocational Training. 2008. Vocational Training Act. Official Journal No. 14 of 15/02/2008, pp. 683–688. <http://www.pist.tn/jort/2008/2008F/Jo0142008.pdf>

36 Presidency of the Government. 2013. Decree No. 2013–2521 of 06 June 2013, amending Decree No. 99–1816 of 23 August 1999, establishing the administrative and financial organisation of the national maintenance centre. <https://www.pist.tn/jort/2013/2013F/Jo0512013.pdf>

5.2 Some key trends in the digitalization of TVET institutions

The survey carried out in Madagascar reveals that the tool most used in training centres is the smartphone for both teachers and learners, followed by the desktop computer for managers. PCs are used by students only in information and training points using ICT (PIF TICs) and in cybercafés, where they are often used for documentary research.

As far as applications are concerned, social networks are the most used. During the COVID-19 pandemic periods, some schools used Facebook with private groups to share course materials with students. Those who could not afford to go online had to retrieve teacher-produced materials from the school. School managers are, in principle, aware of the time-saving benefits and ease of searching for records with the use of digital technology. Teachers are more concerned about the security of the content they produce and the complementarity of digital materials with classroom lessons. All target groups believe that the digitalization of the curriculum is cost-effective, as it reduces travel costs, since internet access offers are considerably cheaper due to competition in the market. Personal development and self-learning were the majority of feedback from all interview target groups, followed by empowerment.

These two arguments are predominant. The findings show, in each area of investigation, that the process of digital transformation in TVET institutions is growing exponentially in large cities close to digital infrastructures, while it is not very advanced in rural areas and far from large cities. For

this reason, the Malagasy Government is currently trying to promote technological solutions for the development of the rural economy with the 'SMART Village' project, currently being followed in approximately 30 rural communes in Madagascar. This initiative consists of offering digital spaces to learn, develop, and undertake innovative socio-economic activities in a remote area.

In Nigeria, a study conducted to partially map ICT infrastructure shows that of 38 technical colleges participating in an ongoing World Bank IDEAS project, about 75 per cent have no access to internet connectivity and 79 per cent have no servers. The report continues: 'The availability of bandwidth determines how students learn: whether through online, blended or face-to-face initiatives and whether teaching is traditional or more student-centred.' While some of the technical colleges surveyed had internet connectivity equipment such as C-band satellite dishes, radio beacons, and masts, the study indicates that the equipment available was not in working order³⁷. Of the 38 technical schools surveyed, the majority do not have educational software (76 per cent), school management software (68 per cent), or engineering software (78 per cent). It is difficult to imagine the digitalization of TVET without the required software infrastructure or, as 98 per cent reported, not having access to reliable electricity.

Available records indicate that women are not equitably represented in TVET in general, and in the technology sector, in particular. For example, in Nigeria, overall, women accounted for only 37.5 per cent

³⁷ World Bank IDEAS Project. 2021. *Mapping and Profiling of Technical Teachers and Instructors, ICT, Water Sanitation and Hygiene Facilities in Technical Colleges*. First Imperial Consulting

of enrolments in all TVET institutions in the 2016/2017 academic year³⁸. The only exception is in the colleges of health technology, where 70.6 per cent of the enrolment was female. In polytechnics, female enrolment accounted for 41.8 per cent; in agriculture colleges, female enrolment accounted for 35.9 per cent; in specialized institutions, 34.9 per cent; in professional enterprise institutions, 43.7 per cent; in innovation enterprise institutions, 29 per cent; and just 15.5 per cent of enrolments in technical colleges for 2017.

Women also constituted only 20.5 per cent of teaching staff in all TVET institutions in Nigeria in 2017. To reverse the trend and encourage women's participation in TVET in general, and in the digital economy in particular, a number of stakeholders reported that they have developed policies and practices that encourage them. For example, Lagos State Council for Technical and Vocational Education (LASTVEB) Director of Partnerships reports that they are extending the time-frame for training at their vocational centres specifically to enable greater participation of women.

In Nigeria, 87 per cent of TVETs have not yet digitalized any part of their training programme but 86.4 per cent of TVETs plan to digitalize all courses in their programme, even those not related to ICT. There are no digital learning resources in 87 per cent of TVETs and 82 per cent of TVETs do not have an adequate digital teaching infrastructure.

In Rwanda, the country's current digital training and support framework shows how a government can provide the necessary

training and support to citizens who lack digital skills, confidence, or access. To this end, a number of policies and strategies are being developed for the implementation of digital transformation in TVET, namely, the ICT in TVET Policy, the Digital Talent Policy, and the e-Learning Platforms policy. Of the 456 TVET schools in Rwanda, 212 offer ICT-related courses, while the rest teach ICT as a cross-cutting course.

Regarding infrastructure and equipment, ICT is integrated into all curricula, digital content is developed and uploaded to an e-learning platform, and an electronic portal is in place. Many of the TVET providers (80 per cent) have computer labs and are therefore connected to the internet and 50 per cent of trainers are equipped with laptops. Between 2019 and 2020, 50 per cent of TVET trainers have been trained in ICT, by the RTTI, with the support of the ICDL programme and Microsoft, and aim to train all of them before the end of 2022.

In Chad, there are 53 TVET schools spread throughout the country, including those in refugee camps. It should also be noted that only 23 CFTPs (Centres de Formation Technique et Professionnelle) are operational, 11 of which are on their own premises and 12 on borrowed premises. They offer 25 courses. In terms of training equipment, they are generally out of use, and for those that are not, they are obsolete. In other words, they can no longer be used to train young people in today's trades. All existing public CFTPs need to be rehabilitated and re-equipped to meet the standards of training for the trades required by the evolution of the national economy.

38 NBTE data from 2016/2017

In Tunisia, the technical disciplines were the first to benefit from the digitalization effort, identified from the outset as the most ‘compatible’ with the integration of ICT, starting at primary school. Indeed, with the financial support of the African Development Bank, the Ministry of Education is implementing a vast programme to support the development of technical and technological skills, in particular with actions aimed at integrating the digitalization of technical, technological, and scientific courses in secondary schools.

At the level of technical colleges and secondary schools teaching the ‘technical sciences’ section, an additional effort has been made to provide technical rooms, specialized rooms, and workshops with computer equipment. Strategic guidelines for the reform of the national vocational training system were drawn up in 2013 by the supervisory ministry³⁹. These guidelines cover the period 2014–2018, and, in this case, advocate the integration of ICT skills into the curricula of training and training of trainers (point 1.2.3.2).

Despite such measures, ICTs are still far from being considered a strategic lever for transforming the sector. The measures announced are part of sub-objective 1.2 of the strategy: ‘Society’s view of vocational training is improved’.

Despite the great efforts made in all these countries, digital technology seems to be slow to find its place in the vocational training system. For example, in Tunisia, the absence of terms such as ‘digital’, ‘numérique’, ‘Technologies de l’Information et de la Communication’ from the decree establishing the organization of the supervisory ministry and defining the roles and responsibilities of its many structures⁴⁰ is, in this respect, revealing. One of the explanations for such a paradoxical situation undoubtedly lies in a ‘cultural heritage’ that is still present despite the many changes, and which considers vocational training as an apparatus for producing a moderately qualified workforce, performing manual tasks in well-defined sectors, such as construction or manufacturing industry.

39 Vocational Training and Employment. 2013. *Reform of the National Vocational Training System: Policy Paper and Operational Plan 2014–2018* http://www.emploi.gov.tn/uploads/pdf/Reforme_FP_Tunisie-Fr.pdf

40 Official Gazette No. 81 of 08/10/2019, pp. 3473–3488. Decree n°856 of 26 September 2019 on the Organisation of the Ministry of Vocational Training and Employment

5.3 Training by and for digital technology: Methods and training modalities

In Madagascar, as stated, training provision operates in most cases with obsolete equipment and teaching materials and, above all, a curriculum that is not up to date.

TVET stakeholders in Nigeria agree that the training curriculum is outdated and not aligned with industry needs. Currently, there is no information available on whether there is a fully digitalized training course in the NBTE-regulated institutions.

While the national TVET policy provides for the alignment of the curriculum with ICT, the practice is different. Training courses in TVET institutions regulated by the NBTE therefore still need to be highly digitalized.

Digitalization is largely more developed in the private sector, where organizations such as Etiwa have digitalized some courses for the construction sector. ULesson, another private sector player, has digitalized the primary and secondary school curriculum for non-TVET courses. Participants have to pay to access the course content. In addition, most public TVET institutions report that they do not have digital learning resources. LASTVEB has developed an LMS (learning software) for its vocational training programme. While databases, blockchain, and artificial intelligence have been deployed in sectors such as financial services, there does not appear to be widespread use of these technologies in the TVET system in Nigeria. However, a number of organizations are teaching basic robotics, artificial intelligence, and coding to primary and secondary schools in Nigeria. The micro-learning modules usually provide a good amount of information in between two

and five minutes, to help learners achieve specific and actionable objectives. In the informal and non-formal sector, Nigerians create thousands of short videos every day to teach their audiences about a wide variety of professional topics. These videos are posted on social media platforms like Facebook, YouTube, WhatsApp, Tiktok, and Instagram. Overall, 56 per cent of TVET institutions still predominantly use face-to-face teaching.

In Rwanda, in institutions with digital content, most of the digital content includes all the information presented to learners. Depending on the profession targeted (computer applications, computer maintenance, computer systems technology, digital media production, information technology, networks, and software development), this content can take various forms, such as text, static visual and video elements, audio, and interactive elements, depending on the level. At the primary level, it is awareness-raising.

In Chad, the national expert knows of no study on the actual content of vocational training and none on the teaching methods that require this digitalization. It seems that the lack of equipment is a major obstacle in the country.

In Tunisia, a distinction is made between training by digital and training for digital. In the first case, a World Bank report indicates that 44.7 per cent of the Tunisian population had a fairly good use of digital technologies in 2018, with five out of six basic computer skills mastered, compared to 46 per cent in Finland in 2014. This is undoubtedly a success story of the early integration of ICTs into the local education system from primary school. Since

2004, ICT has been taught from the third year of primary school onwards. Learners are familiarized with computers and the internet from an early age. They are also required to carry out certain digital projects using office automation, graphic design, and multimedia software, and by carrying out targeted research on the web⁴¹. In secondary school⁴², students are introduced to electronic circuits and components in technological education courses, while computer science courses enable them to improve their skills in the use of computer work environments, internet technologies, and in the creation of digital content. In secondary education⁴³, digital technology is very present in the curricula of the ‘technological sciences’ section. Despite the provision of curricula, 67 per cent of the computer science and technology teachers interviewed mentioned the lack of training and 70 per cent highlighted the quality of equipment and networks as the main concerns preventing optimum performance during lessons and practical work.

In other words, whether in school education or vocational training, teachers and trainers in Tunisia are making increasing use of ICT in their lessons, a practice made possible above all by the availability of fixed or mobile projection units (desktop PCs or laptops + video projectors) in all education and training establishments, whether public or private. With regard to ICT use, 40 per cent of teachers and 46 per cent of trainers say they use

ICT regularly, and, of those, 41 per cent of teachers and 44 per cent of trainers say they have been doing so for over 15 years. More than half of them report using their own portable equipment and/or internet connection in class. In schools, 40 per cent of activities are digital rising to 46 per cent in training centres. In addition, in public and private vocational training centres, production activities and simulation exercises are carried out by learners individually or in small groups. In the absence of incentives, clear instructions, guides, and supervision, the activities that form part of ICT-enhanced face-to-face teaching or training remain essentially dependent on the commitment and goodwill of the teacher or trainer.

Also in Tunisia, 53 per cent of teachers and 62 per cent of trainers say that they have used blended learning activities at least once during the current year. The Tunisian virtual school was created by virtue of Decree No 119 of 28 January 2002. According to this decree, it is a distance learning and training platform offering courses and activities for learners in basic and secondary education⁴⁴, as well as training for teaching staff. Although the school had the necessary technical platforms and infrastructure, it functioned as a learning resource and training space, rather than as a true distance education and training environment. After a few years, its official website www.evt.edunet.tn disappeared from the web, giving way to other resource

41 Ministry of Education. 2021. *Primary School Curricula* <https://bibliotheque-educative.blogspot.com/2021/09/barameg-2021-2022.html>

42 Ministry of Education. 2020. *The curricula for preparatory and secondary education*

43 Idem.

44 Cursus. 2002. *The Tunisian Virtual School* <https://fr.cursus.edu/1636/bienvenue-a-lecole-virtuelle-tunisienne>

spaces, often redundant and little used by learners, such as <http://concours.revision.cnte.tn>, <http://www.ecolenumerique.tn>, or <http://www.bve.cnte.tn>.

Following the first containment in Tunisia in March 2020, in response to the spread of COVID-19, a new integrated digital solution was announced at <https://scolarite.education.tn>. This portal brought together various services for the benefit of all stakeholders, including distance education and training services based on Microsoft Office 365, while allowing for the integration of other solutions, such as Google Meet and Zoom. It was ultimately only used to a limited extent due to problems with the administrative procedures for registering teaching staff. New terms of reference are being finalized to implement a new solution as part of the GovTech project,⁴⁵ which is part of the national digitalization strategy.

More than half of Tunisian teachers and trainers (54 per cent) say they have shared content and/or led online sessions with their learners during the 2020–2021 lockdowns decreed following the waves of COVID-19. There is a clear advantage in this area for private institutions, with a usage rate of 69 per cent, compared to 31 per cent for public institutions.

In conclusion, in the countries sampled, there is equipment and proposals for the digitalization of institutions, but in an uneven and very fragmented manner. In several of the countries in the study, technical equipment is available, although this should be put into perspective in the absence of ongoing maintenance efforts. Lastly, the digitalization of TVET is known to be more developed and organized in private fee-paying institutions.

⁴⁵ <https://www.mtc.gov.tn/index.php?id=522>

5.4 Key issues in digital training for TVET staff

A country's entire digital development depends more on its training capacities and the digital skills of its educators than on the provision of abundant equipment. This chapter highlights the weaknesses, short- and medium-term responses, and strengths in this area for each of the countries studied. Each country seems to have become aware of these challenges without being able to meet them, as the task is so complex and concerns all strata of society.

In application of the terms defined in the PSE, and by the need to properly frame the training requests of administrative agents and TVET teachers, with a view to reinforcing skills in pedagogical methods and techniques and, above all, skills and capacities of adaptation to the use of the computer tool, the Madagascan METFP created the National Training Institute for Public and Private TVET Personnel (INFor), an organization attached to and dedicated to this training for both the public and private sectors. This institute was created in 2001 to respond to any training demand from the TVET regional directorates and public and private TVET establishments. It is a public institution under the administrative supervision of the Ministry of TVET and operates on an autonomous state budget via the Ministry of Economy and Finance.

INFor has also taken the initiative to digitize the books of the Library of the Lycée Technique du Génie Civil, thanks to the implementation of an application dedicated to the database management of the books, for on-screen reading of the

scanned books, classified in catalogues and non-downloadable digital bookshops. The books are donated by UNESCO Madagascar. In this digital library application, there are, currently, only books on civil engineering.

In addition, distance training of TVET teachers and trainers is an immediate concern for INFor. A training course on the use of ODEL (Open-Distance E-Learning) software has already been organized thanks to a collaboration with the African Development Bank. Thus, 80 teachers of technical high schools and school officers have benefited from training on the creation of a digital teaching module and on posting contents produced on a server of the Moodle application physically installed at the information system department of the METFP. The objective of this training was to ensure continuity of training despite barrier measures caused by the COVID-19 pandemic.

In Nigeria, there is no available systematic training programme for TVET teachers and instructors. Any staff member willing to do capacity building has to organize it at their own expense; similarly, TVET trainers, and anyone else in charge of such training, build their own programme without it necessarily being based on an effective needs analysis and without following a rigorous progression plan. Over 52 per cent of tertiary TVET respondents said that their instructors lacked the necessary ICT skills. A 2021 report on the assessment of technical teachers and instructors in 276 technical colleges indicates that a total of 56.58 per cent of

technical teachers and instructors have low to very low ICT skills⁴⁶. In the Open, Distance, Flexible, and Online Learning (ODFEL) policy and strategy document developed in 2019, the council highlighted the major challenge in its implementation as ‘the lack of qualified professionals to support the implementation of ODFEL.’⁴⁷

The Nigerian government estimates that by 2030, 95 per cent of teachers and instructors should be digitally literate. To achieve this, training needs to be integrated into initial and in-service training plans⁴⁸. However, the National Policy and Strategy for a Digital Economy does not specify how the training will be operationalized. In the same vein, the National Education Policy (NPE) 2004 provided that ‘teacher education should continue to be emphasized in educational planning and development’ in recognition of the ‘central role of quality teachers in the provision of quality education at all levels.’⁴⁹ For example, 69.6 per cent of TVET headteachers acknowledged that they needed help in drafting a digital transformation strategy for their institution.

In Rwanda, only 50 per cent of trainers are trained in ICT, by RTTI with support from the ICDL programme and Microsoft. TVET managers have not received any training

beyond what they may have acquired at university. TVET directors still lack digital skills. So far, no school headteachers have been trained beyond the digital skills acquired in universities⁵⁰.

In Tunisia, the National Centre for Training of Trainers and Training Engineering (CENAFFIF) ensures training engineering, develops and updates vocational training programmes, and produces the necessary didactic tools for their proper application. It is also responsible for developing training plans for building capacity of human resources in the sector, both for trainers and managers. In 2008, the Ministry of Education had 208,402 civil servants, i.e. almost 1/3 of the total number of civil servants in Tunisia⁵¹. The continuous training of these civil servants is mainly ensured by the National Centre for Training and Advanced Training, which manages 26 regional centres covering the whole territory of the republic. The centre sets the standards for the different professions related to education and prepares and implements the necessary training programmes and actions⁵². The Centre International de Formation des Formateurs et d’Innovation Pédagogique⁵³ is the second actor in the field of continuing education, at the level of the Ministry of Education. Its mission

46 World Bank IDEAS Project. 2021. *Baseline study of technical teachers and instructors in Nigeria to assess the availability, working conditions and the situation around training and further training*, KOMTEK Engineering Services

47 NBTE. 2019. *National TVET Policy and Strategy on Open, Distance, Flexible and E-Learning*

48 National Digital Economy Policy and Strategy 2020–2030

49 National Policy on Education, 2004

50 For Chad, information is not available

51 Ministry of Finance. Finance Law 2022. http://www.finances.gov.tn/sites/default/files/2022-02/Loi_des_Finances%202022_0.pdf

52 Ministry of Education. Government Decree No. 2019-265 of 6 March 2019, establishing the national centre for training and skills development

53 International centre for training of trainers and pedagogical innovation.

is to offer study and training services for trainers both for structures under the Ministry and for other local or foreign structures⁵⁴.

Of the Tunisian heads of vocational training establishments contacted, 97 per cent said that they considered technical training to be 'very important'. However, they almost unanimously asked for it to be accompanied by other training in areas such as change management, project management, risk management, stress management, team building, governance, management of educational and training structures, quality management, etc. A community of practice comprising several thousand teachers integrating ICT into their professional practice has been very active since the early 2000s, and training courses have been provided in all education delegations. National and regional summer schools for training trainers were also held to widen the circle of teachers innovating with ICT and to accelerate change. When the Ministry of Education halted

this process in 2008, it had a considerable impact on the ICT integration project and was also detrimental to the entire education system. At the beginning of 2010, a training course leading to certification, the Certificate of Competence in Computer Science, was introduced⁵⁵. Other courses have been developed, such as the Microsoft Imagine Academy, which offers a certification course based on the UNESCO ICT Competency Framework for Teachers⁵⁶. The National Centre for Technology in Education has set up a distance learning platform offering teachers 20 training modules.

The training of teachers, trainers, and supervisors in these countries is still very limited⁵⁷ and, when some positive initiatives are put in place to develop digital skills, it would seem that they suffer from the same problem as that of teacher training: it is not yet considered to be of primary importance and, therefore, this training suffers from any decrease in funding or political fickleness.

54 Ministry of Education. Government Decree No. 2016-716 of 6 June 2016, on the merger into the National Centre for Training of Trainers in Education (CENAFFE) and the National Centre for Pedagogical Innovation and Research in Education (CNIPRE)

55 <http://www.certification.cnte.tn/>

56 <https://unesdoc.unesco.org/ark:/48223/pf0000368966>

57 No information is available for Chad

5.5 Successive TVET funding and support schemes

In Madagascar, TVET accounts for less than 4 per cent of current expenditure in the education sector. Households contribute a quarter of current expenditure to their children's education, including digital education. As for capital expenditure, the state provides the only financing (17 per cent of investment expenditure in education). In recent years, the state has increased its efforts in favour of TVET, particularly in terms of investment.

The Constitution of the Federal Republic of Nigeria enables private actors, NGOs, and other interested stakeholders to participate in digital skills development at all levels from primary to tertiary. It provides the legal framework for private sector participation in skills development. Consequently, the GME, NBTE, and other government bodies are actively seeking collaboration with private actors for the sustainable development of the sector including voluntary organizations, communities, or individuals. In the Ministry of Education, particularly in the Department of Educational Planning, the involvement of the private sector and the Technical and Vocational Training Partnership is facilitated. The decentralization of the country allows the federal ministers of education, finance, and labour and employment to mobilize this funding through an annual budget allocation from the federal government. Additional

resources are mobilized through special taxes such as the mandatory 2 per cent school tax administered by the Tertiary Education Trust Fund. According to the NPE, funding for skills development is a joint responsibility of the public and private sectors⁵⁸.

In Rwanda, interviewees were satisfied with the ability of TVET managers to develop a financing plan/strategy.

In Chad, funding for TVET comes from three sources: the state (ministries, National Support Fund for Vocational Training [FONAP]), the private sector (companies, including parents' associations), and international agencies (e.g. AFD, the French Development Agency).

In Tunisia, by law, TVET institutions are allowed to generate their own income beyond government subsidies and tuition revenues. A number of TVET institutions provide consultancy services or set up market-oriented businesses to finance themselves. The budget for vocational training in 2020 was around 402 MDT⁵⁹.

TVET financing in these countries is often mixed, and is a public/private arrangement with frequent uncertainties. There is no real, sufficient, stable, and sustainable financing policy, a challenge that directly concerns all stakeholders.

⁵⁸ National Policy on Education, 2013

⁵⁹ 132 million USD at current exchange rate.

5.6 Links with the labour market: A necessary strengthening of digital skills to improve employability

In order to better respond to labour market demand, Madagascar has restructured training courses and created new establishments or branches. For the five priority sectors of the National Technical Education and Vocational Training Policy (PNEFP), sectoral steering and coordination committees have been set up. In accordance with the provisions of the law promulgating the PNEFP, the committees are placed under the joint responsibility of the sectoral ministries concerned and the professional sector. In view of their employment potential, certain sectors have been targeted as a priority by the PNEFP:

- Rural development;
- Information and communication technologies;
- Building and public works;
- Tourism, hotels, and restaurants;
- Textiles, clothing, and accessories.

These sectors have started to implement projects and training. Within the framework of these projects, they can set up training engineering units (as is the case for the building and public works branch) within the framework of the FORMAPROD project, financed in partnership with the AFD, through a specific committee on construction and public works. Even if they do not set up their own training units, all the sectors play an important role in defining the qualification needs for their sectors and are involved in the work of developing curricula.

In Nigeria, more than 52 per cent of TVET institution heads surveyed stated that they do not organize career days where potential employers are invited. Most of these institutions have no direct link to the formal or informal private sector orga-

nizations that will ultimately employ the students they train. The hiring process usually starts with the advertisement of vacancies to attract applications. The process proceeds from the pre-selection of candidates, to interviews, and final placement on the job after an induction programme. The whole process used to be manual, but has become increasingly digitalized and automated, especially for professional services firms in cities like Lagos, Abuja, and Port Harcourt, recruiting mid- to senior-level employees for their clients.

According to a recently released National Strategy for Transformation (NST) study, to effectively meet the digital skills needs of the labour market in Rwanda, 5,126 people would be required at the business associate level (ICT skills, but not ICT professionals), 1,681 at the ICT professional level, and 6,716 at the expert level, spread across various areas of specialization covering the ICT sector. In terms of education level, 3,245 skilled persons are needed at bachelor level, 487 at master level and 16 at doctorate level. The study also revealed that the projected capacity to deliver skills over the period 2015–2018 is estimated at 12,466 units of skills with either a graduate degree or secondary school certificates. However, Rwanda lacks competent people at the professional and expert level. In terms of quality, the NST report therefore confirms a large mismatch between the supply and demand of people with digital skills, especially at the professional and expert levels. With increasing access to and use of shared infrastructure and services, mobile services, and cybercrime, strengthening the supply of training has become even more imperative for Rwanda.

Chad established the Office National pour la Promotion de l'Emploi⁶⁰(ONAPE) in 1992, FONAP in 1993 and the National Youth Support Fund (FONAJ) in 2010. In addition, the Observatory of Education, Training, and Employment (OBSEFE) was created to centralize, process, and analyse statistical data on education, training, and employment, which are collected from the relevant services. In addition to these bodies, the country updated and validated PNEFP in 2014, following the Employment Forum organized by the government with ILO support in November 2010. The overall objective of the PNEFP is to contribute to increased employment opportunities and strong economic growth through its cross-cutting functions in relation to employment. At this stage, the current architecture seems to require a stronger investment in the field of digital training and professional integration.

In Tunisia, the main mission of the National Observatory of Employment and Qualifications (ONEQ) is to ensure the monitoring and evaluation of policies, programmes, and measures adopted in the field of vocational training and

employment, and to monitor the integration of those leaving the training and education system into working life. It also identifies the needs in qualifications and competences at national level and analyses the employment and training market at regional and sectoral level. In order to fulfil these tasks, the observatory develops an information system relating to data on vocational training and employment, including in the digital sectors.

The link with the labour market seems to be made more by opportunities than by a sustainable and concerted institutional strategy, with the exception of Madagascar, which places the public-private partnership within the various professional branches at the heart of its national system. In countries without such a national strategy, some professional sectors manage to find their own way by offering their own internal training which ensures the acquisition of the skills necessary for the positions they offer. There is a mismatch between the supply and demand for qualifications, especially for digital skills, in countries without a structured national system.

60 National office for employment.



Part 6
**Prospects and
recommendations**

6.1 Lessons learned, gaps to fill

The country reports, as a whole, show that it is necessary to maintain and optimize the structures set up for digitalization in order for the systems analysed to modernize and be able to project themselves into the future of the labour markets at global level. Optimization requires motivated and stable managers who are familiar with IT tools. Awareness-raising, itself followed by more specialized or even highly specialized training, will make it possible to inculcate the corresponding behaviour and habits once and for all. A maintenance budget, used wisely, is necessary for the development and technical renewal of tools.

At the level of public schools in Madagascar, the lack of competent teachers is notorious due to retirements and the recruitment of young teachers without pedagogical experience. The state is called upon to review its commitment to contracts with temporary teachers and administrative staff, the majority of whom have the status of 'short-term employees'. Furthermore, the computer equipment is outdated and insufficient, and the vocational training buildings need to be renovated.

For Nigeria to have a comfortably digitally literate population, at least 10 per cent of its population should have advanced digital skills. Material resources are probably secondary to digital skills. Therefore, skills development systems are striving to align with future occupa-

tional requirements. In this area, even the most advanced systems are struggling. With an unemployment rate of 33.3 per cent, an underemployment rate of 22.8 per cent in the fourth quarter of 2020, and 'two-thirds of the graduates who enter the labour market each year end up as part of the working poor'⁶¹, Nigeria's challenge is more evident than ever. In the Nigerian Youth Employment Action Plan 2021–2024, the FGN identified the problem: 'The TVET system faces a number of challenges, including institutional complexity due to a decentralized governance model, limitations in terms of training infrastructure and materials, and a focus on theory as opposed to practice'.

In light of the fourth industrial revolution, Nigeria's skills development ecosystem is still in its infancy and its capacity to respond to digital challenges remains weak. The 2017 International Telecommunication Union's (ITUs) Technology Development Index (IDI) ranks Nigeria 143rd out of 176 countries⁶². The 2017 IDI report indicates that Nigeria is one of the lowest ranked countries despite not being a Least Developed Country (LDC): 145th on the access sub-index; 147th on the use sub-index, and 147th on the skills sub-index⁶³.

Industry 4.0 conceptualizes the impact of rapidly changing technologies on society in general and the world of work, in particular. In Nigeria, ICT has been changing the way people live, work, and communicate

61 Commit Technologies. 2021. *Bridging Digital Talent Gaps: Development of Emerging Skills in ICT at NBTE and NBTE regulated institutions*

62 The IDI is an index published by the United Nations ITU and based on 11 globally accepted ICT indicators grouped into three clusters: access, use, and skills

63 <https://www.itu.int/net4/ITU-D/idi/2017/index.html#idi2017economyocard-tab&NGA>

with each other for some time, especially since the liberalization of the telecommunications sector in 2000. The telephone, and increasingly the smartphone, have brought about such fundamental changes that the two decades between 2000 and 2020 have seen more social change than the previous four decades between 1960 and 2000 combined.

In addition, Nigeria's Human Development Index value for 2019 was 0.539, 'placing the country in the low human development category – ranking 161 out of 189 countries and territories'.⁶⁴ Human development is a prerequisite for digital transformation. In the Global Competitiveness Report 2018, covering 141 economies and published by the World Economic Forum, Nigeria ranks 118th for ICT adoption, 94th for innovation capacity, and 129th for skills. A review of the data from these different sources indicates that Nigeria urgently needs to prepare its current and future workforce to acquire current skills.

In Rwanda, despite significant improvements in the ICT sector and a more advanced positioning in terms of digitalization of the labour market and TVET provision, this study highlights the following ICT-related TVET gaps:

- Existence of contradictory TVET statistics, which shows the importance of strengthening management information systems for better steering.

- Lack of clear policies, frameworks, and strategies to promote women's training and ICT-related employment opportunities.
- Lack of a clear framework and strategy for collaboration between ICT policy makers, the private sector, and TVET providers.

In Chad, in addition to previous remarks, apart from the proliferation of bodies dealing with ICT development and training in the use of ICT, Chad has increased the number of directorates of the Ministry from 4 to more than 8. This ratio seems to express a low flexibility/receptivity of public actors regarding the digitalization of the vocational training.

In Tunisia, despite real potential, the system continues to suffer from serious shortcomings affecting its various components, preventing it from fulfilling its role and providing learners with the various opportunities to acquire the knowledge, skills, and abilities necessary to work in a digitally intensive profession.

All the countries in the study are aware of shortcomings in three important areas: digital training for teachers, instructors, executives, and managers; renewed equipment of technological tools; and an ongoing and organized policy on digital technology, particularly in TVET.

64 UNDP. 2020. *Human Development Report 2020*

6.2 Some good practices

The Malagasy government is tending to dematerialize its services as much as possible, particularly for the management of civil servants and their salaries through the AUGURE system. Such a development makes it possible to unify the data and to locate each person in a stabilized manner. This action should undoubtedly be pursued in other areas of government or even private service. The arrival of the COVID-19 pandemic has revitalized the Blue Economy⁶⁵, through a national programme to digitalize the education system in order to remain in line with the initial objectives of the National Education Policy of Madagascar. The ministry is in the process of finalizing this project in collaboration with the partners of the Malagasy state.

In Nigeria, Providence Vocational Academy reports that the laboratory has internet and uninterrupted power supply for students who intend to work on the school premises. This model is hopeful because it creates a hub within the school environment with basic infrastructure requirements for learners. This model can be extended to learning centres set up in strategic locations across the country, catalysing an ecosystem in the most remote and disadvantaged locations for the transmission of relevant skills. This school uses a bandwidth manager that produces weekly reports on internet usage.

A good starting point in Nigeria has been to look at mature technologies and platforms already in the marketplace and, in this respect, the prospect of distance and flexible learning as framed in the Nigerian ODFEL Policy and Strategy 2019 can be explored. Some good practices

are cited in the country report where they are assessed in terms of their quality of collaboration or sustainability, cost effectiveness, or capacity building:

- Edtech in general, and digital TVET in particular, are new sectors in Nigeria.
- Some actors in the private and public sectors are taking the initiative to digitalize the curriculum, especially the curriculum from primary to secondary level. Some private sector actors have tentatively started to digitalize TVET.
- NBTE reports that it has recently engaged a consultant to conduct a baseline assessment of selected academic and non-academic staff of the federally-owned polytechnics, on the basis of the IC3 system for digital literacy.

Rwanda, with over 96 online public services available, has successfully translated the expansion of ICT infrastructure and digital capacity building into strategies. A number of initiatives are recommended as good practice:

- Creation of the ‘Digital Technology Division’ within the Rwanda TVET board
- Establishment of centres of excellence for ICT and digital transformation, and ecosystem innovation centres.
- Establishment of e-learning platforms adapted to the different levels of the education and TVET system. These include:
 - The e-learning platform
 - TVET management information system
 - The platform for the supply of consumables

⁶⁵ The sustainable use of ocean resources for economic growth.

- The provision of computers and other equipment to all TVET trainers. Although only half of this is covered, the process of covering all of it is underway.
- The appointment by the Government of Rwanda of an ICT and digital transformation officer in each government institution, including those responsible for education/TVET.
- A salary increase of RWF 200,000 (USD 200) for all ICT trainers and other administrative staff in charge of ICT and digital transformation within the government.
- Tax exemption on all imported ICT-related equipment and tools, including teaching and learning materials.
- Issuance of a student smart card in the form of an identity document.

In Chad, four examples of good practice can be reported:

1. The Training and Professional Integration Platform created in 2014 through the combined effort of private and public actors. This initiative was brought about through a signed framework agreement to strengthen the links between the member actors. It is a multi-actor space that contains 15 members, of which seven are state and eight are non-state.
2. The Bab Al Amal project implemented by the French NGO ESSOR, in consortium with three other Chadian NGOs, which aims to provide training and professional integration for vulnerable Chadian youth. The project was implemented from 2018 to 2020 in five provinces of Chad, including Sarh in the

Moyen Chari, Moundou in the Logone Occidental, Bongor in the Mayo Kebbi West, N'Djamena in the Chari Baguirmi and Abeche in the Ouaddaï.

3. In 2017, Swiss cooperation in Chad launched the FORMI programme (Formation et Insertion des Jeunes au Tchad). This programme covers the TEVT sub-sector and is based on the national guidelines for the development of inclusive vocational training. Its objectives are to accompany and support the Chadian government in its efforts to revitalize and reform the TVET sub-sector, with particular emphasis on the promotion of innovative and inclusive training and vocational integration schemes, adapted to local socio-economic realities, and managed in partnership by the various actors involved. It is a twelve-year programme (2017–2029) divided into several phases, namely:

- Access for young people to quality, diversified, and relevant training opportunities;
- Improved access for young people to local information/guidance and funding services;
- Governance of vocational training.

4. The project implemented by the NGO Humanité et Inclusion to promote the professional and economic integration of people with disabilities through advocacy, in particular through a personalized support approach for people with disabilities. The training courses focus on sewing, motorbike and car mechanics, IGA development, etc.

The Open School for Workers (EOT) in Tunisia is part of the *Institut de promotion supérieure du travail*⁶⁶ (IPST), a body of the National Centre for Continuing Education and Professional Development (CNFCPP) under the Ministry of Employment and Vocational Training. In the 2000s, the school adopted an innovative approach that enabled it to offer ‘local training’ that met the needs of learners: faced with reduced funding and few attendees, it resorted to distance learning. Initially, thanks to agreements with a large number of education and vocational training establishments, learners who did not have access to the internet could go to the agreed establishments and access the platform, while receiving on-site support. With the widespread availability of connections, these establishments now host groupings and workshops organized as part of blended learning, while learners can access the online courses completely independently. In addition to a relatively low operating cost, this approach allows the EOT to offer an extremely rich and varied range of

training courses and to reach a very large number of learners spread throughout the country. It offers CC, CAP, BTP, and BTS courses with 49 face-to-face courses and 147 non-presence courses.

Also in Tunisia, in partnership with international companies such as IBM⁶⁷ and openclassroom⁶⁸, the National Agency for Employment and Self-Employment offers, via its online training space, access to a range of training courses, some of which are certified, for the benefit of jobseekers and youth. These training courses cover four main areas: ICT, entrepreneurship, soft skills, and foreign languages. The space also offers advice and support services. It is an e-learning platform that provides learners and teaching staff with free access to a fairly comprehensive range of quality training courses that can lead to internationally recognized certifications. Imagine Academy training spaces have been set up in nearly 90 public vocational training centres and in several dozen public and private universities.

⁶⁶ Institute for Labour Promotion.

⁶⁷ <https://developer.ibm.com/digitalnation/africa/>

⁶⁸ <https://openclassrooms.com/fr>

6.3 Promising centres in each country

Each country has its own centres of excellence and has established its own criteria for defining them. These selection criteria are interesting for several reasons, as they highlight the requirements for successful deployment in each country.

These requirements can provide a profile of what would be a successful centre for technical and vocational training through digitalization for the target country, or even the whole economic community to which the country belongs.

6.3.1 Three centres of excellence

In the light of the above criteria, each country selected the three centres of excellence in their country that could be replicated within their respective regional economic community.

The Madagascar study indicates as possible centres of excellence:

- The Lycée Technique et Professionnel Alarobia, an industrial technical high school. By its history and size, it is the largest industrial technical school in Madagascar. The existing training courses and streams are training of computer maintenance technician training of general technology (78 men and 17 women), initial professional training (894 students of which 55 women), qualifying professional training (434 students of whom 18 are women), training of higher technician (188 students of which 4 women).
- The LTP Antsirabe, a public TVET institution with 210 students. The success rate in the 2020 national exams is 100 per cent for the CAP and 90.90 per cent for the BEP. The school has a computer room with eight functional computers, not connected to the internet. The room can accommo-

date up to 30 computers. This equipment is used daily by 60 students for practical training in computer science. Computer training is included in the initial training programme for learners, and an annual in-service training session is reserved for teachers. The school also hosts training for teachers and even groups of the public who wish to participate in training sessions. It also welcomes learners and teachers from other CFPs (Centre de Formation Professionnelle)⁶⁹ in the Vakinankaratra Region. This school is therefore a real regional reference centre for computer training. Moreover, the school also has an interactive digital board, which is the only one still fully functional among the hundreds provided by the Ministry of Education, the others having suffered from a lack of maintenance. During the lockdown, course materials were shared through a private group on social networks to avoid a huge delay in the curriculum. The school is working with several partners for asset development – the 3MS Antsirabe Association donated the eight computers with the corresponding furniture.

⁶⁹ TVET Centre

The Nigeria study indicates as possible centres of excellence:

- The Cross-River Institute of Technology, which has two streams of business administration management and computer science, trains 90 people, 22 of whom are women.
- The Federal Polytechnic School of Ilaro, which has 27 different courses (insurance, marketing, aquaculture, regional planning, taxation, food technology, etc.) and houses 4,127 trainees, of whom 1,974 are women.
- Kaduna Polytechnic, which has 61 streams (petroleum, social development, cartography, etc.) and accommodates 26,711 students, of whom 9,793 are women.

The Rwanda study indicates as possible centres of excellence:

- Kisaro TVET School, a subsidized free school, with 11 academic staff, eight administrative staff and 150 boys and 90 girls. It is through a presidential commitment that this new TVET school (7 years) has become a model. The development of the infrastructure was supported by the Swiss Agency for Development Cooperation through Swisscontact.
- KiYumba TVET School, a public school in the Southern Province, with 17 academic and six administrative staff. It has 62 boys and 70 girls. It is a new TVET school (3 years) and a model. The development of the infrastructure was supported by SDC through Swisscontact. It is a school owned by the Catholic Church.

- NYABIHU TVET School, a public school in the Northern Province, with 20 academic and 7 administrative staff. It has 125 boys and 85 girls. It is a new TVET school (3 years) and a model. The development of the infrastructure was supported by the SDC through Swisscontact. The school is owned by the Catholic Church.

The centres of excellence selected in Rwanda, when supported to meet all standards, may also serve other TVET schools in their territory. All selected centres have been accredited by the National Examination and School Inspection Authority (NESA). They use the recommended competency-based training (CBT)/competency-based assessment (CBA) approach. Academic and administrative staff are recruited on the basis of the defined job description and all are trained in pedagogical and digital skills. The centres are strategically located to serve the surrounding community, including other schools (primary and secondary) in the same area. Each centre has equipped itself with at least one ICT laboratory and plans to set up at least two SMART classrooms each.

The Chad study indicates as possible centres of excellence⁷⁰:

- Centre Technique d'Apprentissage et de Perfectionnement, a multi-disciplinary centre with a technical platform that meets TVET standards. The current number of students is 300, including 15 girls, first and second year combined. Five courses are offered, namely metal and wood construc-

⁷⁰ In Chad, only two centres were identified as matching the criteria.

tion with 25 students, industrial plumbing and electricity with 100 students, electronic and computer maintenance with 50 students, industrial cold electricity with 25 students, and automotive mechanics with 100 students. The training courses take place from 7am to 1.15pm in alternating mode, i.e. 50 per cent of the time at the centre and 50 per cent in the workshop. The technical teaching leading to a BTS is provided by trainers who have a master's degree. The general education market, namely secretarial and accounting, is provided by trainers with a bachelor's degree. The objective of the centre is to train students to be self-employed, even though a majority of them are employed in working life. Their integration rate is estimated at over 90 per cent. It should also be noted that, according to the director of the centre, the centre is currently working on a census to have exact data on the opportunities quantified by field.

- Secours Catholique Pour le Développement, a vocational training centre for car and diesel mechanics, which is based on Catholic structures that welcome all strata of Chadian society for several years. They are fairly well equipped and have good training frameworks that lead to employment. Local companies often turn to them for recruitment requests, providing them with labour that meets their

needs. This centre was also created more than 30 years ago and also operates on a sandwich training mode which proves to be a better formula for rapid integration and empowerment. Currently, 40 students, including one woman, attend the courses. Diesel car mechanics is the centre's speciality. Students enter on condition that they have an incubation garage to facilitate the alternation system. The following subjects are taught by 10 trainers: logistics management and entrepreneurship, mathematics and physical sciences, quality, health and environmental safety, computer science, general and professional technology, industrial drawing, automobile electricity, and communication. The diploma is that of the professional certificate. There was a time, about 20 years ago, when most of the students who finished were hired by the NGOs. In 2002, about 10 learners were hired by oil companies. Since 2017, economic difficulties have begun to impact on the level of integration of learners to the point where fewer than 10 are hired after training. The centre also intends to develop training in mechanics and maintenance of agricultural machinery in the future.

These centres have been in existence for over 30 years, having been established since the 1990s.

The Tunisia study indicates as possible centres of excellence:

- **Centre of Excellence in Aeronautical Industry Professions**, with training in six specialities related to aircraft mechanics in addition to continuing education for professionals. It will enable young people to obtain the BTP in two years and thus become aircraft structure fitters, aeronautical boilermakers, laminator-draftsmen in composite materials, aeronautical surface treatment and painting technicians, aeronautical cable fitters and mechanical manufacturing technicians on digitally controlled machines.

The Centre of Excellence in the Aeronautical Industry

Year of creation: 2001

Number of learners (2021): 200

Administrative staff: 18

Teaching staff: 20

Strengths:

- A unique centre in the field of the aeronautical industry,
- A high added value of ICT in education,
- Trained and committed managers,
- An administration sensitive to the contribution of ICT,
- Adequate infrastructure,
- Potential in the field of distance learning.

- **Centre Sectoriel de Formation aux Métiers du Tertiaire de Gammarth**, with training in seven specialities related to the tertiary sector, in addition to continuing education for professionals. It will enable young people

to access the BTP in two years and thus become company accountants, computer management technicians, and trade and distribution technicians. The centre also offers training that allows young people to access the BTS in accounting and finance, commerce, and international commerce and management assistance in two years.

The Sectoral Training Centre for Tertiary Professions in Gammarth

Year of creation: 1969

Number of learners (2021): 900

Administrative staff: 42

Teaching staff: 80

Strengths:

- A national reputation in the field of service trades,
- A member centre of the UNESCO Global Academy of Digital Skills,
- A high added value of ICT in education,
- Trained and committed managers,
- An administration sensitive to the contribution of ICT,
- Adequate infrastructure,
- Potential in the field of distance learning.

- **Sector Training Centre for Graphic Arts of Ariana**, with training in five specialities related to the graphic arts and the world of printing and publishing, in addition to continuing education for professionals. It will enable young people to achieve the BTP in two years and thus become pre-printing technicians, printing technicians, finishing technicians for printing work, or screen-printing technicians. The centre

also offers a two-year training course to enable young people to obtain the BTS in telecommunication techniques.

Sector Training Centre for Graphic Arts of Ariana

Year of creation: 1989

Number of learners (2021): 800

Administrative staff: 25

Teaching staff: 45

Upgrading project: PAFIP (development, infrastructure, equipment, training of trainers, etc.)

Budget: 6,600,000 dinars)

Accommodation capacity: 800

Strengths :

- Unique centre for graphic arts,
- A high added value of ICT in education,
- Trained and committed managers,
- An administration sensitive to the contribution of ICT,
- Adequate infrastructure,
- Potential in the field of distance learning.

In order to involve the private sector, the study suggests including in this list of vocational training centres with good potential in the field of ICT:

- Carthage Art Academy⁷¹, a centre specializing in audiovisual, journalism, and design.
- RBK Tunisia centre⁷², specializing in coding and applying a completely innovative and relevant approach.

Their inclusion could pave the way for a better sharing of experiences, in terms of training and strengthening the employability of learners through ICT, and create opportunities for fruitful public-private partnerships. It would also fit in with other projects already underway, including the network of entrepreneurial centres project⁷³, supported by the European Training Foundation and involving, in its pilot phase, five public and four private centres.

71 <https://www.aac.ens.tn/fr/>

72 <https://www.rbktunisia.com/>

73 https://www.etf.europa.eu/sites/default/files/2020-11/centre_entrepreneurant_-_concepts_et_cadre_de_travail.pdf

6.4 Priority needs, improvement actions

The needs and priority actions will be dissociated from the country proposing them to arrive at an operational summary taking into account the needs of the African continent and the actions that

would need to be taken, not only to meet these needs, but to act to effectively assist in the development of the introduction of digitalization in the country, and more specifically in TVET.

6.4.1 Priority needs

In general, the priority needs identified by the five country studies are:

- Training and capacity building for all actors, including trainers, managers, and executives.
- Clear, applicable qualifications framework for levels of TVET digitalization.
- Digitalization of the TVET curriculum in its various vocational areas, in particular in the technical, technological, and scientific pathways.
- Vocational training infrastructure and technology.
- Reliable and affordable bandwidth.
- Uninterrupted power supply.
- Shared resources through the creation of inter-country networks on training programmes, technological tools, and evaluation tools.
- A framework that integrates TVET into local technology ecosystems.
- Development of learning centres and a digital skills programme.
- Funding of research and development in the different sectors.
- A checklist of modalities for the private sector to invest more heavily in TVET and vice versa, to promote strong training–employment linkage.
- Development of the skills to install a work–management information system.
- Development of public–private partnerships.
- Digitalization of competency-based programmes.
- Development of interactive content for the e-learning platforms for all economic sectors and priority trades.
- Numerous centres of excellence to develop emerging skills using the IC3 standard.

6.4.2 Actions to be taken

Numerous actions are proposed, classified into five areas: governance, technical equipment, training, financing, and human resources. Most of them are realistic and, with outside help, however small, could help to unblock a system that is too often

passive and lacking in skills in the face of the very characteristics of any change.

These proposals for action are not prioritized as they depend very much on national contexts and political will.

6.4.3 Governance

- Create participatory workshops for the production and validation of a document accepted by all stakeholders, a national strategy on the digital transformation of the education system and TVET systems, from which a decree of application could be issued for its execution, with the help of a national programme on the digitalization of TVET, to guarantee the integration of partners in efficient and sustainable achievements.
- Encourage and attract private sector investment in TVET, e.g. by offering tax incentives and subsidies, or introduce a compulsory business contribution to finance the sector, such as the Fonds Malagasy de Formation Professionnelle⁷⁴ model. The approach should be included in investment and financial policies.
- Promote governance bodies bringing together all the institutions concerned and integrating the companies of each professional branch, on the model of the sectoral partnership steering and coordination committees in Madagascar, which are currently jointly implementing training restructuring projects, by involving companies in the definition of qualification needs and in the work of developing curricula.
- Establish a coordination body between the TVET structures under supervision. Organize information and mutualization between the bodies responsible for vocational training and those, often private, responsible for links with the professional environment.
- Strike a balance between excessive centralization, which hampers positive initiatives, and strong decentralization which does not always allow for the coherent and efficient functioning of the development of digitalization in TVET.
- Support TVET managers in drafting a digital transformation strategy, in terms of funding and new technology/software, training and infrastructure programmes, and training of trainers and technical support.
- Develop autonomy at the level of training centres, impacting on their capacity to innovate and adapt to their contexts.
- Balance economic demand and individual needs, by ensuring a match between training courses and the needs of business, which requires a constant review of training programmes to facilitate this.
- Leverage partnerships with the private sector to extend the skills already developed within the private sector and for the benefit of public institutions.
- Have a systemic vision of vocational training that incorporates all the associated elements (the labour market, training centres, changes in qualifications, changes in the profile of learners with regard to new technologies, introduction of AI, etc.).
- Establish a national centre for the promotion of ICT in vocational training, which would coordinate vocational training courses and update them according to the needs of the labour market. TVET should not be the last wheel in national training policy.

⁷⁴ The Madagascar training fund.

- Engage policy-makers, TVET managers, and cooperation partners to define the financing modalities for the acquisition and deployment of the hard and soft infrastructure required by the sector.
- Tap into the talent pool of the country's technology ecosystem.
- Avoid a parade of successive officials by ensuring the sustainability of policy decisions on digitalization of TVET.
- Create bridges throughout schooling between general education and TVET (e.g. creation of a vocational baccalauréate in Tunisia).
- Reduce administrative procedures that are incompatible with the pace of digital transition projects (public procurement system, etc.)
- Tailor cooperation projects to the targeted demands of the country's sector, rather than to the offer of foreign partners.
- Create a training map that covers the whole territory equally (location of centres, resources, etc.)
- Produce clear and injunctive official texts on the transformation of TVET into a digital society.

6.4.4 Technical equipment

- Enable the centres of excellence to shine in the country and beyond. To this end, give them greater national and local technical recognition.
- Encourage initiatives (e.g. the application of a digital library, such as the one produced in Madagascar and currently operational, where no adequate infrastructure is available to deploy it in the lycées' libraries). Facilitate the installation of this application on a secure server accessible to the digital libraries of TVET schools for multimedia reading.
- Carry out a nationwide survey of all computer equipment, whether functional or no longer functional, in all TVETs, as well as of the rooms available, with a view to preparing a national project for the equipment and/or installation of ICT centres in all TVET establishments.
- Provide dedicated internet services for the skills development sector. As a priority, develop a framework with telecommunications service providers that will offer special rates for data and internet services used for educational purposes. These services must not only be affordable, but also reliable.
- Harnessing renewable energy sources to meet the needs of the country in general, and the TVET sector in particular. The objective should be to power the facilities that store the hardware and software infrastructure required for digital TVET. This would be more sustainable, environmentally friendly, and cost-effective in the medium to long term.
- Introduce ICT equipment in TVETs which are in desperate need of it and compensate for the obsolescence of existing equipment by maintaining it.
- Have a centralized national platform for distance learning.
- Support in the digitalization of programmes which requires collaborative work between technicians and trainers.

6.4.5 Training

Training is at the heart of TVET: without the skills of the people involved in TVET, even the most sophisticated technology will be ineffective. Proposals for action include the following:

- Teachers, staff, and learners are, in the majority of cases, already initiated and aware of the use of digital technology and ‘teaching and learning differently’ methods, but this seems largely insufficient. Accompanying measures in terms of technical upgrading should be provided, including dedicated equipped rooms and connected gardens.
- Carry out a national survey to define training needs and prioritize training programmes. For a digital transformation project in TVET to succeed, the establishment and adequacy of a digital infrastructure must be accompanied by a national user training programme.
- Set up a capacity-building programme for trainers through an in-service training programme, which would cover the whole territory of the countries concerned, not only for digital education but also for their own subject discipline. The training courses most in demand by teaching staff are 21st Century Pedagogy and Open-Distance Learning.
- Provide initial and ongoing training for TVET planners, managers, and instructors with assessment tools to build the human capital needed to initiate and sustain a digital transformation of the TVET system.
- Create a digital skills and assessment programme for all levels of the education sector and aligned with the needs of Industry 4.0. Policy-makers, TVET managers, industry, and private sector stakeholders can work with cooperation partners to develop and promote this.
- Establish an online digital competency framework for TVET staff.
- Make an inventory of existing multimedia and ICT resources and create an online directory (for teachers/trainers).
- Provide a user guide for teachers and trainers who want to implement ICT-based training.
- Set up learning centres at strategic locations with the necessary hardware and software infrastructure where learners can have uninterrupted access.
- Change the image that society has of TVET learners (justified by the generally average quality of the learners recruited), which limits the opportunities for the development of technological fields and perpetuates the image of remedial and last chance vocational training. That is to say, it is open to an elite of learners, as companies using ICT for professional purposes tend to demand higher academic levels from the professionals recruited.
- Explore a joint initiative between government and digital entrepreneurs to create technology-based career options.
- Where a number of TVET providers offer similar courses, develop collaborations to address the gaps in the business environment that they face due to technological advances in skills development.
- Offer refresher training in the use of ICT for women.

6.4.6 Financing

- Allocate a certain proportion of education budgets to the development of digital skills and infrastructure in TVET institutions.
- Explore innovative funding models.
- Increase public investment to deploy the necessary infrastructure, especially in remote locations, where the cost-benefit ratio discourages private sector participation.
- Grant public vocational training centres the status of public scientific and technological establishment to, allow them greater management flexibility and greater opportunities to set up partnerships or launch projects.
- Promote the pooling of skills and equipment, and the sharing of resources between TVET institutions in order to share costs.
- Negotiate with providers to implement special tariffs for bandwidth used for educational purposes at national level.
- Offer paid services oriented towards both the local and external markets. These services could be alleviated by a system of scholarships for people of modest means.
- Encourage policy-makers and all stakeholders to find innovative ways to fund R&D that will promote the development of local technology. This encouragement can take the form of grants, donations, or collaborations with the private sector where the products developed can be commercialized.

6.4.7 Human resources

- Develop and consolidate a national qualifications framework and encourage people with skills acquired in the informal sector to join the formal education system, in order to encourage their participation in the digital economy.
- Allow flexible, scalable bridges between the different structures of TVET, made necessary by the different and evolving digital skills.
- Develop ICT training modules that meet the specific needs of each field, in a cross-cutting manner and in connection with virtual communities of learning and practice.
- Acknowledge the importance of distance learning, in particular by promoting the development of blended learning paths for lifelong learning.
- Establish guidance systems based on computerized labour market information systems, which advise learners effectively in their choice of career, and allow greater integration of girls and women into TVET programmes.
- Enable work to counter people's resistance to change, for example, by familiarizing young people with digital technology from primary school, or even nursery school, or by involving adults in leisure workshops using ICT tools.

Conclusion

This study illustrates the urgency of addressing the digitalization of TVET in the sampled countries. Competition in the development of nations and continents is now played out on the dimension of ICT development, applied to all areas in life. This particularly affects technical, industrial, and market production. Forms of thought, social and international relations, workplaces, learning – in short, everything in human life – is now digital. Digital illiteracy is one of the issues that absolutely must be addressed if we consider that

the world's raw material is no longer oil, but digital data and the use of artificial intelligence.

The African continent has great potential and hope in its youth, and with this comes the need to focus on training. The Pan-African Initiative for the Digital Transition of TVET and Skills Development Systems in Africa provides an excellent opportunity for building sustainable digital ecosystems in Africa, based on the findings of this multi-country study.

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Bibliography

Annexes

This publication, produced by SOFRECO at the request of IIEP-UNESCO, takes stock of the digitalization of technical and vocational education and training (TVET) in Africa based on a sample of five countries (Madagascar, Nigeria, Rwanda, Tunisia and Chad). This report describes the systems in these five countries that provide the population with access not only to digital tools but also to the skills that will enable everyone to use digital technology.



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