



5TH
PASET
FORUM

EVENT REPORT

20–22 MAY 2019 | KIGALI | RWANDA
Radisson Blu, Kigali Convention Center

DESTINATION DIGITAL AFRICA: PREPARING OUR YOUTH FOR THE FUTURE

May 20-22, 2019 | Kigali, Rwanda

Acknowledgements

The 5th PASET Forum was led by the PASET Executive Board and co-organized by the Government of Rwanda (host country) and the World Bank with gracious support from the Korea-World Bank Group Partnership Facility and China-World Bank Group Partnership Facility. Additional support was provided by implementation partners of PASET initiatives: the International Centre of Insect Physiology and Ecology (*icipe*) and Inter University Council of East Africa (IUCEA).

We would like to extend our sincerest gratitude to the Government of Rwanda, particularly Hon. Minister Eugene Mutimura, his adviser for science, technology and innovation, Mr. Michael Hughes, and their team for co-hosting the 5th PASET Forum, supporting the organization of the event and for their warm hospitality in Kigali. We would also like to express our whole-hearted appreciation for the time, efforts and commitment of the teams from the World Bank, *icipe* and IUCEA to make the event a success. We are also extremely thankful to the Consultative Advisory Group for their support in planning the Forum and facilitating discussions during the Forum.

The success of an event relies equally on the participants who elevate the discussions. We extend our deepest appreciation to the Ministers and delegations from Benin, Chad, Ethiopia, Ghana, Guinea, Kenya, Mozambique, Sierra Leone, Tanzania, and Zambia, and representatives from Burkina Faso, Cameroon, Congo (Democratic Republic of), Congo (Republic of), Cote d'Ivoire, Mali, Mauritius, Nigeria, Senegal, and Togo for their active participation. We are also extremely grateful all the speakers, moderators and commentators for readily sharing their knowledge and experiences, and exhibitors including the RSIF scholars who displayed their research and innovations during the Forum. We also thank the Forum facilitator for ably coordinating the sessions and discussions during the Forum. Finally, we are very thankful to all the participants who took the time to attend the conference and added great value to the discussions.



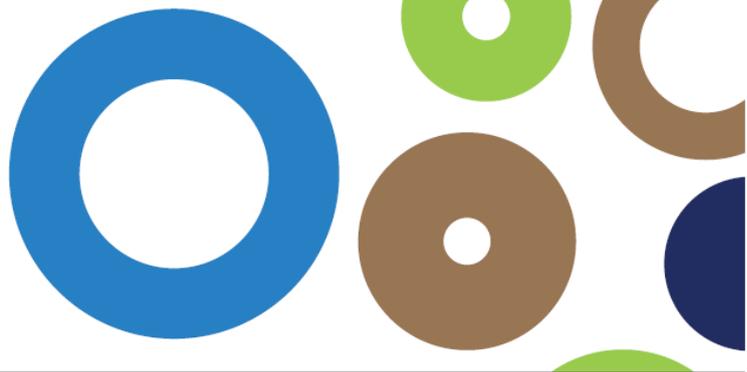
List of Abbreviations & Acronyms

3D	Three Dimensional
4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
ASET	Applied Sciences, Engineering and Technology
GDP	Gross Domestic Product
<i>icipe</i>	International Centre of Insect Physiology and Ecology
ICT	Information, Communication and Technology
IFC	International Finance Corporation
IoT	Internet of Things
IUCEA	Inter-University Council for East Africa
MoU	Memorandum of Understanding
MOOC	Massive Open Online Courses
NREN	National Research and Education Network
PASET	Partnership for skills in Applied Sciences, Engineering and Technology
PPP	Public-Private Partnership
Q&A	Questions & Answers
R&D	Research and Development
RSIF	Regional Scholarship and Innovation Fund
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering and Mathematics
TVET	Technical and Vocational Education and Training

Table of Contents

1. Introduction	5
2. Objectives of the Forum.....	5
3. Forum Participants	5
4. Format of the Program.....	6
5. Key Take-aways from the 5 TH PASET Forum.....	6
DAY 1	8
Session 1: PASET’s Progress	8
Session 2 - Opening Ceremony	9
Session 3 - Fourth Industrial Revolution (4IR) and Digital Economy.....	11
Session 4 - How Far Advanced are Countries in Preparing their Workforce	13
Session 4.1 Experience from Asia	13
Session 4.2 African Country Experiences.....	15
Session 4.3 Presentation by the Government of Rwanda	16
Welcome Dinner at Serena Hotel	17
DAY 2	19
Session 5 - PASET Initiatives in Higher Education and Skills Development.....	19
Session 6 - Advanced Digital Skills and Intermediate Skills Requirements.....	20
Session 7 - Innovations in Delivering Higher Education and TVET.....	22
DAY 3	25
Session 8 - Country Presentations and Reflections on Country/Regional Initiatives.....	25
Session 9 - Conclusions and Next Steps	32
ANNEX 1 - Forum Agenda.....	34
ANNEX 2 - List of African Delegations.....	38
ANNEX 3 - List of Exhibitors	39

Destination Digital Africa: Preparing our Youth for the Future



1. Introduction

On May 20-22, 2019, the 5th PASET Forum, "Destination Digital Africa: Preparing our Youth for the Future" was jointly hosted by the Government of Rwanda and World Bank in Kigali, Rwanda to discuss the implications of the 4th Industrial Revolution (4IR) and the digital economy on higher education and skills development in Africa. The Forum, the largest knowledge exchange platform of the Partnership for skills in Applied Sciences, Engineering and Technology (PASET), convened Sub-Saharan African (SSA) governments, international policy makers and technical experts, academia, and the private sector to share knowledge, exchange ideas and identify actions to prepare Africa's youth for a digital future. The event was inaugurated by the Right Honorable Prime Minister of Rwanda Dr. Edouard Ngirente, and included participation at the highest-level including Ministers of Education from 11 SSA countries and the Global Director for Education at the World Bank, Dr. Jaime Saavedra.

2. Objectives of the Forum

The objectives of the 5th PASET Forum included the following:

- i. Explain the 4th Industrial Revolution and the opportunities and risks for Africa
- ii. Share global models and approaches to adapt higher education and technical and vocational education and training (TVET) ecosystems to disruptive changes brought about by the 4IR and digital economy
- iii. Provide update on PASET's growth and progress, and strengthen the partnership
- iv. Mobilize financing and technical assistance for PASET's initiatives among SSA governments, partner countries and organizations, private sector, development partners and donors.
- v. Deliberate on new PASET initiatives related to developing digital skills for the 4IR and help countries formulate action plans.

3. Forum Participants

Approximately 300 participants attended the Forum and contributed to the discussions. This included government delegates from 21 SSA countries, including Ministers of Education from 11 countries, senior officials and speakers from partner countries like Korea, China, India, and Japan as well as Singapore and the United States, and representatives from the private sector, foundations, universities, research organizations, and TVET institutions. Scholars from PASET's Regional Scholarship and Innovation Fund (RSIF) also participated in the Forum and exhibited their research. Members of the PASET Governing Council, Executive Board, and Consultative Advisory Group, and education managers and specialists from the World Bank participated and moderated several sessions as well in addition to teams from implementation

partners of PASET initiatives - the International Centre of Insect Physiology and Ecology (*icipe*) and Inter University Council of East Africa (IUCEA).

4. Format of the Program

The Forum was held over 2.5 days with sessions and panels on a variety of topics related to the 4IR and digital economy. During this time, participants also had the opportunity to view an exhibition on the new research and innovations being undertaken by RSIF PhD scholars, universities and TVET institutions. Prior to the Forum, African country delegations attended a half-day workshop on May 19, 2019 to discuss their preparedness for the 4IR and the digital economy, based on questionnaires completed before the Forum.

Several important events were also held on the side-lines of the Forum including: (i) The PASET Governing Council Meeting; (ii) PASET Consultative Advisory Group Meeting; (iii) a signing ceremony for four new Memorandums of Understanding (MoUs) between PASET, three Korean institutions and one Moroccan institution for collaboration on RSIF; and (iv) a partnership meeting between Chinese private sector and African higher education and TVET institutions.

5. Key Take-aways from the 5TH PASET Forum

- i) The 4IR and digital economy are transforming the skills requirements for jobs. Technical skills (including digital skills), soft skills, entrepreneurial skills and workforce readiness are becoming a priority. The emerging technologies of the 4IR such as robotics, artificial intelligence (AI), big data analytics, cloud computing etc. also offer exciting opportunities to address Africa's challenges.
- ii) Digital technologies and new uses of data and information will disrupt many sectors in Africa. Whether these changes are beneficial or not for people will depend on their skills.
- iii) African governments recognize the urgency of advancing digital opportunities for their booming young populations, which form their most valuable asset. Political commitment and ownership from African Governments will be vital to transform the existing traditional education systems and ensure that the digital transformation is positive for populations.
- iv) Investment and reforms in areas such as teaching and curriculum, Information, Communication and Technology (ICT) infrastructure, internet connectivity and regulations, intellectual property rights and use of technology in higher education and TVET systems will be important so that 4IR technologies can be leveraged. Re-skilling and up-skilling of populations through interactive, adaptive and personalized learning in a cost-effective manner using short-courses, distance learning, and virtual learning and training will also be critical.
- v) Perceptions of TVET education will need to change from being education for low academic performers to an instrumental program in the implementation of 4IR initiatives and innovations.
- vi) SSA countries can learn from the experience of partners such as Singapore and Korea to develop effective country action plans for digital skills. Action plans must focus on well-defined activities, have a clear division of roles and responsibilities, include a comprehensive budget and clear monitoring and evaluation plan.
- vii) The Digital Economy for Africa Moonshot initiative of the World Bank will invest about USD25 billion up to 2030 to support Africa's digital transformation. This provides a huge opportunity for countries that are ready to access it and it could be mobilized to support countries to further develop their digital skills country action plans. PASET offers an effective and flexible platform to collaborate on this and help countries to strategically build their capacity.



DAY 1

EVENT PROCEEDINGS

DAY 1

Session 1: PASET's Progress

The 5th PASET Forum commenced with an overview of PASET's progress, and a discussion on the level of preparedness of African education systems for the digital economy. Ahead of the official opening ceremony and the arrival of the guest of honor, presentations were made on PASET's growth and progress and possible new initiatives.



Moderator: Jost Wagner (Managing Director, The Change Initiative)

PASET's growth and ongoing initiatives. Prof. Aminata Sall Diallo (Executive Director, PASET Executive Board)

- PASET has made considerable progress since the 2014 Dakar Call to Action. There have been myriad achievements and milestones in a short time span of 5 years including the adoption of its Charter and governance structure; launch and operationalization of its initiatives - the Regional Scholarship and Innovation Fund (RSIF), Regional TVET Initiative, and Regional Benchmarking of SSA universities - and mobilization of funds for the same from SSA countries as well as partners like Korea and the World Bank.
- PASET is unique due to a variety of factors including its focus on applied sciences, engineering and technology (ASET) from the TVET level to higher education and research, the strong political will of member countries which helped to found the partnership, its nimble governance structure and emphasis on results, impact and efficiency.
- PASET has three areas of work: (i) incubating and operationalization of regional initiatives; (ii) technical assistance to countries; and (iii) knowledge sharing particularly with newly industrialized countries.

How prepared are African education systems? Dr. Sajitha Bashir (Adviser for Science, Technology and Innovation, Office of Global Director of the Education Global Practice, World Bank)

- Countries can use an appropriate digital skills framework to assess competencies and proficiency levels. There are seven competence areas: devices and software operations, information and data literacy, communication and collaboration, digital content creation, safety, problem-solving, and

career-related competences. The four proficiency levels are foundation, intermediate, advanced and highly specialized.

- New courses are required and need to be taught differently observing the different proficiency digital skill levels.
- Affordable internet connectivity is essential in this revolution, especially "last mile" connectivity for universities and TVET schools. Fibre optics connectivity has increased a lot and National Research and Education Networks (NRENs) have done tremendous work to improve connectivity between universities. However, the pricing for connectivity is still high and more work is needed for TVET schools' connectivity.
- Leadership and capacity building are essential to leverage new technologies. A strategy is needed to overcome procurement of technology, interoperability issues, lack of local content, and proprietary issues related to content.
- Nine technologies are shaping the future include advanced robotics, additive manufacturing, augmented reality, simulation, horizontal and vertical system integration, industrial Internet of Things (IoT), cloud computing, cyber security, and big data and analytics.
- Three scenarios have been predicted for Africa: Africa arisen, Africa for Africa and Africa adrift.

Session 2 - Opening Ceremony

The 5th PASET Forum was declared open by the Prime Minister of Rwanda, Rt. Hon. Edouard Ngirente. Other dignitaries also delivered remarks.



Moderator: Josephine Nyiranzeyimana (Government Chief Information Officer, Rwanda Information Society Authority)

Hon. Prof. George A.O. Magoha (Chairperson of the PASET Governing Council and Cabinet Secretary of Education, Kenya)

- African youth are the most valuable asset in the age of the 4IR and need to be equipped with the right skills and knowledge to become a competence-based workforce.
- African Universities and TVET will need essential infrastructure to produce knowledgeable and skillful youth. They will also need to connect with each other and discuss to mobilize resources for research in science, technology and innovation.
- PhD programs need to focus on real inventions and innovations with tangible impact rather than academic research in order to push the needle for Africa's economic transformation. Investors in research are also needed to achieve this overall goal.

- TVET will be fundamental to empower our youth in daily used technologies.

Dr. Jaime Saavedra (Global Director of the Education Global Practice, World Bank)

- Digital technologies and the 4IR will have sweeping effects on our lives, disrupting current trends on how we live and work. New digital skills will be required in various sectors of our economies and no one can predict the extent to which this revolution will affect each sector.
- Africa has been predicted to have 20 million new jobs each year, hence the right skills must be imparted through education to avoid crises. Fundamental skills, social-emotional skills and digital skills have been projected as particularly important in the upcoming era. Africa needs to invest in both basic and higher education.
- PASET has endeavoured to pursue the goal of empowering African youth through improving science, engineering and technology in TVET institutions and universities. The World Bank is supporting this mission and is also setting up centres of excellence around Africa. We need to continue to urgently invest in our people.

Mr. Moongi Choi (Director, Europe and Africa Cooperation Division, International Cooperation Bureau, Ministry of Science and ICT, Korea)

- Korea has advanced in research and development (R&D) due to progressive economic growth of the country. Science and technology supports economic growth of countries in areas such as education, administration and energy and also address global challenges such as climate change.
- Korea works with PASET in areas of science and technology to boost economic growth of beneficiary countries. Korea will continue to work with PASET through signing more MoUs and member countries to continue collaboration.



Hon. Dr. Eugene Mutimura (Minister of Education, Government of Rwanda)

- The 4IR requires all African countries to work together as these are times of rapid change. The demands of education are changing hence African governments need to equip and empower the youth with relevant skills to explore opportunities so that they can impact our society.
- The 5th PASET Forum will focus on devising ways to support African youth to utilize current innovations. Several new innovations by African young people were highlighted in Rwanda, Kenya and Mozambique.

Guest of Honour: Right Honourable Dr. Edouard Ngirente (Prime Minister of the Republic of Rwanda)

- The 4IR will offer African youth opportunities to benefit from relevant technologies. Quality, relevance and research are some of the principles of education for Africa.
- Mathematics will be key in this transformation, hence Africans need strategies to improve and enhance its teaching along with languages.
- Commitment to PASET will foster the quality, relevance and research principles in education. African countries need to commit to supporting PASET and its initiatives. Rwanda is committed to transforming its economy into a knowledge-based one hence evidenced in its commitment to PASET.



Session 3 - Fourth Industrial Revolution (4IR) and Digital Economy

Following a presentation to contextualize and understand the 4IR and digital economy, a panel of experts discussed the global trend of 4IR and the digital economy, global and African experiences, and the opportunities and risks for Africa.

Fourth Industrial Revolution and the Digital Economy. Dr. Kevit Desai (Principal Secretary, Vocational & Technical Training, Ministry of Education, Kenya)

- The 4IR refers to emerging technologies that are blurring traditional boundaries between the physical, digital and biological worlds. The 4IR is exciting and full of hope because of its transformative aspects at a time when Africa needs to find solutions to issues such as food scarcity. Fields such as robotics, AI, 3D printing, nanotechnology etc. show much promise.
- The value addition of 4IR technologies will lie in their ability to reach the common man. Some technologies already in use in Kenya are precision farming, sensor technology, AI, and blockchain technology which are being applied in agriculture, climate change, and localization of manufacturing.
- At its core, the 4IR is about the highest levels of standards, accuracy and tolerance. Standardization is critically important and harmonization of occupational standards across the continent is crucial to build capacities towards common standards and promote mobility.
- The 4IR is changing the skills required for jobs - workforce readiness, technical skills, soft skills and entrepreneurial skills (which can promote self-employment) will become a priority. Education curricula must be adapted to impart these skills and countries must develop policies to ensure lifelong learning.
- African governments must also create regional centers of excellence to deepen talent pools and institute and fund active labor market programs to keep up with changes in the labor market demand.
- Some of the 4IR technologies in use in Kenya are seen in precision farming, sensor training, artificial intelligence and block chain technology. Kenya welcomes collaboration throughout the African continent.

Panel Discussion

The panel discussion delved into questions such as what the future of work will look like in Africa compared to other regions, the role of technology in increasing access to higher education, importance of public-private partnerships (PPPs) and institutional mechanisms and policy frameworks that can help.



Moderator: Jost Wagner (Managing Director, The Change Initiative)

Prof. Winston Soboyejo (Provost Ad Interim, Worcester Polytechnic Institute, USA)

- The future of work in Africa will depend on whether Africa can move beyond being a consumer of digital technology. It is estimated that by 2030 a significant amount of the jobs will be created by digital needs. There is need to prepare Africa's growing youth population in skills beyond IT, train them in new technologies and build a critical mass that can engage with the new technologies. This will enable Africa to use the 4IR to leverage transformation.
- Policy frameworks and platforms in each country must facilitate collaboration with local companies and ecosystems. In addition, African are often very entrepreneurial in areas where they find no market. The use of accelerators can be useful to leverage the 4IR.
- Africa can be inspired by the Korea's example. They grew themselves by partnering with their diaspora. Africa can similarly use its diaspora and collaborators as an opportunity to leapfrog into the future

Dr. Miriam Altman (Director, Altman Advisory)

- Stronger institutions are necessary to benefit from the 4IR and technology cannot solve all problems. The basics such as availability of broadband need to be in place before digital learning can take place. Moreover, there needs to be an emphasis on soft skills and culture of teaching and learning rather than just hardware.
- PPPs are necessary, but not sufficient. Affordability is the starting point. Broadband should be considered as important as a road or water infrastructure. Private sector financing should not define how to roll it out. It should be commissioned by the Government.
- Standards are important. Standards around broadband roll-out are required and the right competition in the market is needed. Increasingly, privacy is also becoming an issue and standards and consumer protection will be critical.

Dr. Kamau Gachigi (Founder and Executive Director, Gearbox Ltd.)

- In terms of PPP, universities might let private sector run the innovation hubs.
- Governments should consider creating courses that suit the needs for people in the informal sector who live hand to mouth (such as metal and wood workers). Curriculums should be adjusted to allow people to learn new skills while they work. Governments need to work on protection, help with purchase of raw materials and so on, which are unlikely to happen if market forces run freely.
- Pedagogy is very important and there should be more hands-on exposure from day 1. Additionally, one should consider design adapted for the local market.

Dr. Kevit Desai (Principal Secretary, Vocational & Technical Training Ministry of Education, Kenya)

- Digital developments may contribute to manufacturing growth if African countries are able to harness the latest technologies. Government, academia and private sector need to work closely together not only on policy, but also on access to technology, ensuring alignment of technologies to Africa's trajectory, and building capacities in collaboration with local actors to ensure seamless integration.
- Local markets, communities and traditional value chains should be considered. An example from Kenya is the leather and textile value chains in manufacturing. Countries can choose a focus area and build centers of excellence around it.
- Skills upgrades have to be based on standards that promote efficiency and productivity. Standards are the key for transformative change in any sector. PASET is a very thoughtful initiative. It might seem daunting, but we need shared standards throughout the continent, which will be the basis for continental integration and competitiveness.

Session 4 - How Far Advanced are Countries in Preparing their Workforce

During this session, representatives from Asian and African countries shared their perspectives and examples from their countries on preparing for the 4IR and digital economy. The Government of Rwanda also presented their experience.

Session 4.1 Experience from Asia

Moderator: Tania Lozansky (Senior Manager, International Finance Corporation (IFC))

Korea. Strategy of Vocational Competency Development Training Innovation for 4th Industrial Revolution. Dr. Jong Kil Park (Professor of HRD Department at Korea University of Technology and Education and Former Deputy Minister for Employment and Labor of Korea)

- In the early industrialization stage, vocational education alone could not produce sufficient manpower, therefore, the Korean government intervened and took the lead in training.
- Several laws and legal measures were enacted to increase vocational training in the public and private sector. In addition, Vocational Competency Development Programs were initiated such as the work-learning dual system, training by employers, support for self-employed, core vocational competency enhancement training, among others.
- The mega trend has been that the 4IR is causing fundamental changes in vocational training and is reshaping the labour market, including accelerated changes in jobs, expansion of industries and introduction of new vulnerable groups.
- The Korean government announced a new "Strategy for Vocational Competency Development Training Innovation for the 4IR" in April 2019 which aims to eliminate barriers to education and training opportunities, educate future talent to lead innovation, nurture manpower in response to industrial demand, and establish a performance-based society.

Singapore. Nurturing Future-Ready Citizens for a Smart Nation. Dr. Fei Victor Lim (Assistant Professor, National Institute of Education, Singapore)

- For Singapore, the vision is to have a Smart Nation which applies digital technology and data to address issues through a whole-of-government approach in domains such as transport, home and environment, business productivity, health and enabled ageing, and public sector service.
- There have been several enablers for digitization including public administration reforms, educational programs, upgrade of programs, delivery of government digital services, investments in research and development and so on.
- There have been changes in regulations, pricing and investment in infrastructure to support a Smart Nation. Skills needs are forecasted for the nation using "Skills Future" tools with the close involvement of universities and TVET schools
- Singapore also took steps to: 1) build schools with wifi; 2) enhance innovation in schools; and 3) scale up.



India. Preparing for the 4IR and Digital Economy: The India Experience. Mr. Sanjay Dash (CEO, STEP Innovation)

- The STEP UP program develops digital content that is industry-aligned to be used in training and holds various consultancies in a range of sectors (such as construction, automotive, ICT, energy, etc.) on behalf of the Indian government.
- India has five priority pillars for the 4IR including robust infrastructure, access to capital, intellectual property rights, skills training and strengthening research.
- The 4IR entails re-skilling and up-skilling, and interactive and immersive learning in a beneficial and cost-effective manner.
- The Government took initiative by creating a Ministry of Skills Development and Entrepreneurship, upgrading infrastructure, improving academia, bringing trainers to schools, encouraging private sector to participate, and industry led courses in academia.

Session 4.2 African Country Experiences

Moderator: Prof. Goolam Mohamedbhai (Chair, PASET Consultative Advisory Group)

Ethiopia. Hon. Prof. Hirut Woldemariam (Minister of Science and Higher Education, Ethiopia)

- There has been an expansion of the TVET sector and growth in higher education institutes in Ethiopia.
- An enabling ICT policy with institutional arrangements to implement are important to have an ICT driven country as well as knowledge-based economy.
- Ethiopia is currently well connected in terms of coverage and several sectors are adopting digital technologies from agriculture to finance. However, TVET schools and some universities still have poor connectivity.
- There is a national depository system for educational materials as well as digital libraries in some universities. Several digital courses have been added to curricula and all students take a course in emerging technologies as a way to prepare the youth. Universities also have incubation centres.

Guinea. Hon. Dr. Abdoulaye Yero Balde (Minister of Higher Education and Scientific Research, Guinea)

- There is political commitment to keep up with the 4IR.
- Guinea has formed the Guinea Technology Valley that emulates Silicon Valley.
- Guinea is promoting a technology-led education system hence several reforms are on-going: key sectors like agriculture and mining are being focussed on for digital transformation; fibre optic is being laid out across the country; training programs are being initiated in various sectors; curricula have been adapted to match companies' needs; all high schools have electronic communications; and there are virtual libraries in some universities.
- Challenges in the country include access to wide scale internet, human resource issues and funding.



Tanzania. Hon. Prof. Joyce Ndalichako (Minister of Education, Science and Technology, Tanzania)

- Several initiatives such as an ICT policy and corresponding pillars for infrastructure, human capital development etc. have been introduced.
- The government has laid 7500 km of fibre optics and an additional 20,000 km will be built to cover the last mile solution.
- Curricula are being revised to reflect the needs of the 4IR, such as IoT, AI as well as 3D technologies in TVET. e-Libraries have been established from primary to higher learning institutions.
- Connectivity has been improved in higher learning institutions using the Ubuntu service.
- Challenges that the country faces include human capital capacity and funding. The way forward involves increased collaboration, charting new ways to get funding and reviewing the policy roadmap for the 4IR.

Session 4.3 Presentation by the Government of Rwanda



Dr. Emmanuel Muvunyi (Executive Director, Higher Education Council, Rwanda)

- Human skills are critical to leverage the 4IR and Rwanda has placed a great deal of effort in this area considering the country's history where education was segregationally based on ethnic backgrounds.
- Education and training are considered as the main driver for Rwanda's development. Several policies and initiatives have been put in place including initiatives to promote new pedagogy and assessment required by the 4IR, promotion of Science, Technology, Engineering and Mathematics (STEM) programs and enhancement of English language proficiency.
- University of Rwanda has been reformed and merged to raise academic quality as well as to avoid duplication of resources. The same merging policy has also been enacted in TVET colleges which have been merged into Rwanda Polytechnic.

Ms. Claudette Irere (Permanent Secretary, Ministry of ICT and Innovation, Rwanda)

- Rwanda has been getting ready for the 4IR since 2000.
- The journey started with the formation of an ICT policy and institutional arrangements, hard core infrastructure such as fibre optics, use of secured and shared infrastructure, and finally implementing the Smart Rwanda master plan. Currently, the Rwanda Coding Academy has been launched to address readiness for the 4IR.

Mr. Patrick Nyirishema (Director General, Rwanda Utilities Regulatory Authority)

- Rwanda has established a regulatory framework as an enabler for digital transformation. There is a need for smart and dynamic regulations and guidelines. With the 4IR, change is rapid and hence, there is a need for continuous revision.
- Efforts are being made to provide flexible guidelines in cybersecurity and data privacy.
- Rwanda is active at the international level in standardization issues related to the 4IR.
- There are special provisions for companies in critical sectors such as transport by issuing licences.

Mr. Alex Ntare (CEO, ICT Chamber Rwanda Private Sector Federation)

- Digitization of businesses has been a priority. The private sector has worked with partners like Knowledge Lab (K-Lab), which has produced around 60 businesses, and Fab-Lab which has been working on IoT and fabrication in collaboration with MIT.
- Gender gaps in ICT projects has been reduced through training of girls to prepare them for ICT jobs.
- Venture capital is being promoted in collaboration with K-Lab. Fellowships are being promoted in various sectors as digital transformation platforms.

Welcome Dinner at Serena Hotel

The Government of Rwanda hosted a welcome dinner at the Serena Hotel. Remarks were made by Hon. Dr. Eugene Mutimura, Minister of Education of Rwanda and by Mr. Yasser El-Gammal, the World Bank Rwanda Country Manager

Destination Digital Africa: Preparing our Youth for the Future



DAY 2

DAY 2

Session 5 - PASET Initiatives in Higher Education and Skills Development

This session included presentations on PASET's initiatives on higher education and TVET - the RSIF, Regional Benchmarking of SSA Universities, and Regional TVET Initiative.

Prior to the presentations on PASET's initiatives, there was brief presentation by Mr. Didier Nkurikiyimfura, Director of Technology and Innovation of Smart Africa. He spoke about Africa's continued challenges with availability and affordability of bandwidth. He noted that this is the time for Africa to catalyse its transformation through the utilization of 4IR technologies, which will entail reforming the education system, and strong leadership and commitment.



Regional Scholarship and Innovation Fund (RSIF). Dr. Moses Osiru (Manager, RSIF Regional Coordination Unit at *icipe*)

- The RSIF aims to build sustainable doctoral training, research and innovation ecosystems to develop transformative technologies in Africa for economic growth and development.
- RSIF's value proposition is to enable high quality PhD training at affordable rates, avail resources for graduates do research upon return to their home countries, facilitate building of new departments in African universities, and have spillover effects on national research funds. The RSIF also emphasizes an increase in the participation of women in ASET fields and targets at least 40 percent of women as its beneficiaries.
- It has three windows: Window 1 for PhD training in Africa's priority sectors; Window 2 for research grants for applied research to resolve issues facing Africa; and Window 3 for innovation grants to support innovation and commercialization of research.
- Training occurs in 11 competitively selected African host universities in collaboration with several world-class international partner institutions.
- It aims to establish a Permanent (endowment) fund to ensure sustainability.

Regional Benchmarking of SSA Universities. Prof. Bakary Diallo (Rector, African Virtual University)

- The purpose of benchmarking is to allow a university to compare with others and learn from each other. It improves the diagnosis of areas of improvement and orients the design of specific interventions to help SSA universities reach their performance potential.
- Countries benefit from the benchmarking initiative by gaining access to a standardized national system level-benchmarking methodology, the opportunity to compare with other countries, and participating in capacity building opportunities.
- A three-year strategic plan for a data hub and the PASET regional benchmarking initiative is being reviewed by PASET's governing bodies and the World Bank.

Regional TVET Initiative

Regional TVET Initiative. Dr. Abdiwasa Abdilahi (State Minister, Ministry of Science and Higher Education, Ethiopia)

- The Regional TVET Initiative, which is financed as a World Bank project, has the objective to train highly qualified technicians towards creating a skilled workforce that meets the demands of the economy.
- The project addresses challenges at the institutional, national and regional levels focusing on priority industries with considerable shortage in TVET level skills such as transport, energy, manufacturing and ICT.
- Three countries - Ethiopia, Kenya and Tanzania - are participating in the initiative and 16 Regional Flagship TVET Institutes across the 3 countries have been selected for strengthening skills training.

Regional Flagship TVET Institutes, Dr. Kevit Desai (Principal Secretary, Vocational & Technical Training, Ministry of Education, Kenya)

- In Kenya, the flagship TVET institutes focus on transport (marine), manufacturing (textile), power/energy and ICT.
- The program focuses on training, incubation and skills transfer, which are all done with community collaboration and to ensure that the benefits of the 4IR are equally shared especially across genders.

Parallel Sessions

Session 6 - Advanced Digital Skills and Intermediate Skills Requirements

Speakers presented and discussed the implications of the 4IR and digital economy for developing advanced and intermediate digital skills.

Moderators: Safaa El-Kogali (Education Practice Manager, World Bank); Javier Botero (Lead Education Specialist, World Bank)

Advanced digital skills requirements. Dr. Elias Towe (Professor of Electrical and Computer Engineering, and Materials Science and Engineering, Carnegie Mellon University)

- Engineering is key to Africa's development because it creates industries that provide stable and well-paying jobs, and is critical for civil infrastructure. Electrical and computer engineering can pave the path for Africa's digital skills transformation.
- The qualifications of a modern engineer to function effectively have significantly changed from what they were 15 to 20 years ago. Most engineering curricula at African universities are not adapted to train a modern engineer and do not explicitly define their outcomes. These need to be clearly defined so that students and potential



employers in industry understand what to expect.

- Learners should be taught how to learn.
- Some critical recommendations for reform include:
 - Faculty level: reviewing and refining the approach to how course material is presented every semester.
 - Department level: carrying out periodic curriculum review and updates (every 4 to 5 years), and instituting anonymous evaluation of faculty teaching by students and by peers.
 - University-level: arranging for program review of departments by an external panel of experts in the relevant fields; establishing an Electrical and Computer Engineering (ECE) department if there is none.
 - Country-level: articulating development plans and goals that universities can contribute to.
 - Regional-level: establishing a network that can collaborate on shared research interests and shared pedagogical experiences.

Intermediate digital skills requirements. Mr. Chao Chen (General Manager, State Grid Corporation of China Ethiopian Branch)

- Power/electricity is the blood of industrialization irrespective of the phase
- The current state of the power system uses technologies such as ultra high voltage, unmanned aerial vehicle inspection, intelligent robot in substation and power line live work. Machines are used to carry out difficult risky tasks with precision.
- Networks have started to build infrastructure using IoT and AI.
- Apprenticeships, job skill contests and youth innovation competitions are some mechanisms for promoting the growth of youth. In China, practical skills are provided at vocational training colleges at the beginning of one's career and lifelong learning is planned. Technicians use virtual simulation training programs.



Skill needs forecasting for the digital economy. Mr. Gary Gan (CEO, JobKred)

- Skills needs are changing very fast. It is important to understand the skills demand so that there can be changes at the TVET and university levels to adapt to the market needs.
- Forecasting skills needs by using direct industry consultation, surveys, focus groups and national skills frameworks are all slow and expensive methods. The solution is to use big data analytics, intelligent skills-gap analysis, and automatic mapping of curriculum to granular skills and modular education.
- Today, there is an increasing use of AI for course mapping, adaptive curricula, lifelong learning and jobs matching to leverage the needs of the market.

Commentators. Prof. Winston Soboyejo (Provost ad interim, Worcester Polytechnic Institute) and Tania Lozansky (Senior Manager, IFC)

- Engineering is very important in the information age and countries must leverage engineering in problem solving. Strategies are needed to move from education-based trainings towards delivery of solutions.
- There must be reflection on why we teach what we teach and whether it is geared towards solving the African problems. Engineers that are produced should be able to address African problems in renewable ways and methods.
- 230,000,000 jobs will need digital skills in SSA by 2030. This will translate to a USD 130 billion training market between now and 2030. An IFC report on digital skills in SSA looks at 8 models that can be used for upscaling the skills in SSA.
- The private sector has a major role to play in the implementation of the 4IR. A lot can be done at the policy level to help the public institutions leverage the private sector and its ability to provide services. There is an important emerging trend of traditional providers, TVET and universities working together.
- The short course models of 3-12 months appear to work better than longer courses.
- Affordability is key and a holistic approach that emphasizes digital skills alongside soft skills like communication, leadership and teamwork is important.

Session 7 - Innovations in Delivering Higher Education and TVET

Presenters discussed disruptive models of delivering higher education and TVET using digital technologies and new approaches.



Moderators: Michel Rogy, Digital Development (Practice Manager, World Bank); and Scherezad Latif (Lead Education Specialist, World Bank)

Using personalized, adaptive learning in higher education. Mr. Dale Johnson (Adaptive Program Manager, EdPlus, Arizona State University)

- At Arizona State University, 30,000 students do their courses online, while 70,000 students are onsite. The university uses adaptive networks.
- Mass personalization is available today, and this is the goal of adaptive courseware. Delivering the right lesson to the right student at the right time. It is important for African universities to move in this

direction because the old model is a black box.

- There is a need to adapt and change the way we support different students in line with their level of knowledge of the subject matter. At Arizona State University, a tool called Aleks from McGraw Hill is used which tracks the entry level of students.
- Africa can also use adaptive systems and the first step to success is to build Collaborative Adaptive Networks which are configured by professors and personalized for students. These have the potential to be scaled like mobile technology in Africa.

Digital Marketplace Platform. [Dr. Richard Qiu \(Senior Vice President, Global Business Development, Udemy\)](#)

- The 4IR presents a lot of interesting opportunities and changes in work production processes that require continuous learning. The skills learned today may not be relevant in the next few years due to the changes brought about by fast-changing technology.
- The big challenge we're looking at in the next few years is not mass unemployment but mass redeployment. There is a tremendous need for employers to upskill their workforce.
- Udemy provides an opportunity for lifelong learning. This is a necessity since human beings live longer, but the skills set last for a few years and thereafter need to be refreshed.
- 1.5 million students in Africa are learning over Udemy. Udemy offers 10,000 courses. Many college students use Udemy to complement their basic skills.

Distance learning in Africa. [Dr. Bakary Diallo \(Rector, African Virtual University\)](#)

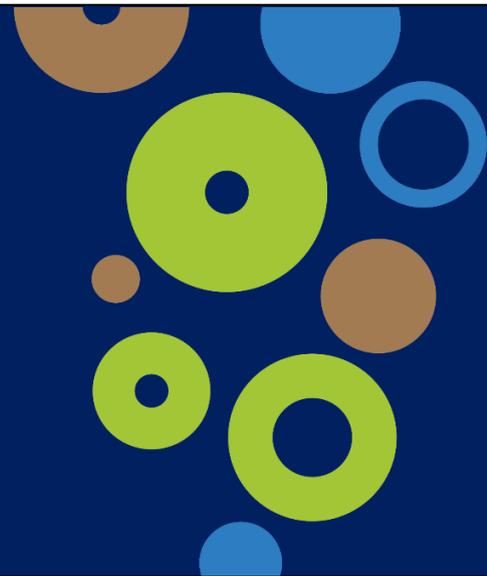
- The lack of readiness of African institutions to undertake distance learning is a challenge.
- The concept of Massive Open Online Courses (MOOCs) has great potential for Africa. AVU is offering 4 MOOCs as a proof of concept and expects to mainstream MOOCs in its operations.
- Several courses are being offered for the 4IR which include: a blended (online and face-to-face) Bachelors in Applied Computer Science that has been developed with 18 African universities, and certificate programs at 27 African partner institutions in areas such as skills for employability (eg. helping students prepare their CV) and faculty professional development in open distance and e-learning among others.
- Challenges include maintaining a high completion rate for MOOCs and online programs, connectivity issues and differing schedules of universities for multi-institutional coordination.

Commentators. [Mr. Suchit Jain \(Vice-President of Strategy and Business Development, SolidWorks\)](#) and [Mr. Clement Uwajenezza \(Country Director, Rwanda, Andela\)](#)

- The models presented are interesting but require enough bandwidth, instruments and infrastructure.
- Curriculum change in partnership with the private sector is necessary to cater for market needs. This must also be accompanied by pedagogical changes with trainers involved in the entire process.
- Faculty need to change their thinking and adopt online learning models. They should offer certificates for the various skills.
- Lab exposure is still critical as part of online learning.
- Trainers will need capacity building for these new approaches. Structures are necessary for certification of the trainers and regulation of certification.
- Political will is necessary to put in place virtual universities and funding is needed to ensure sustainability.
- Digitization of training will be a good solution for refugees.
- The carrot and stick attitude can be employed so that promotion of university faculty and academics is based on how much they have adopted the online teaching.



DAY 3



DAY 3

Session 8 - Country Presentations and Reflections on Country/Regional Initiatives

This session included presentations by countries on their country action plans, which incorporated learnings from the previous two days' presentations and panel discussions. The action plans covered the following four thematic areas:

1. Changes in higher education and TVET courses to prepare for the 4IR and digital economy
2. ICT connectivity for higher Education and TVET systems
3. Using technology to transform higher education and TVET systems
4. Planning ahead

While every country's action plan addressed all four areas, for the purposes of the session, the countries were divided into five groups, with each group presenting on thematic area one, two or three, and all groups addressing thematic area four. Following each group's presentations, comments were offered by selected resource persons.

Moderator: Prof. Crispus Kiamba (Member, PASET Consultative Advisory Group and Professor, School of Built Environment, University of Nairobi, Kenya)

Commentators:

- Dr. Victor Lim (Assistant Professor, National Institute of Education, Singapore and former Director in Ministry of Education, Singapore)
- Prof. Bitange Ndemo (Chairman Blockchain & AI Taskforce, Government of Kenya and former Permanent Secretary in the Ministry of ICT, Kenya)
- Dr. Marito Garcia, (Adjunct Faculty and Fellow, Darden School of Business, University of Virginia and former World Bank sector manager in Latin America).



Group 1: Benin, Ethiopia, Burkina Faso, Ghana (Thematic Areas 1 and 4)

Benin	Ethiopia	Burkina Faso	Ghana
Thematic Area 1: Changes in higher education and TVET courses to prepare for the 4IR and digital economy			
<ul style="list-style-type: none"> • Hasten teaching of STEM courses • Train teachers in tools for productivity, collaborative work, etc. • Implement projects on improvement of pedagogy (eg. Epitech Benin) 	<ul style="list-style-type: none"> • Revise curricula to include AI, STEM, critical and logical thinking, and entrepreneurship • New directive for public universities to provide basic digital literacy training 	<ul style="list-style-type: none"> • Focus on areas that link TVET to higher education such as agriculture, ICT etc. • Establish Virtual University and Polytechnic School of Ouagadougou • Associate industry professionals in decision-making of training institutions to understand needs of employers 	<ul style="list-style-type: none"> • Promote courses on virtual reality, AI, big data, and mechatronics • Conduct skills gap analysis in ICT • TVET curricula to be competency based • Introduce cyber-, network- and information security courses in specialized tertiary institution • Review legal and regulatory environment
Thematic Area 4: Planning ahead			
<ul style="list-style-type: none"> • Include focus on STEM and innovation in strategic plan • Creation of new institutes of vocational education • Digitalization of courses 	<ul style="list-style-type: none"> • Roadmap for HE and TVET for the next 15 years • Amend existing HE and TVET strategies • Improve university/TVET relations with industry 	<ul style="list-style-type: none"> • Increase bandwidth nationally • Expand use of ICT in HE and TVET • Orient training towards the 4IR and adopt new pedagogies • Strengthen partnerships between companies and training institutions 	<ul style="list-style-type: none"> • Incorporate ICT in tertiary education and TVET policy as one of the major pillars • Conduct needs assessment for all tertiary/TVET institutions • Capacity building and infrastructure development

Note: HE = higher education

Commentators:

- Countries can consider promoting digitalization of teaching. Access to resources is almost unlimited and this can address the issue of geography by using the internet. Technology can give a more personalized experience and ensure material is most up-to-date.
- Enhancing skills assessment for individual students and updating university/TVET curricula will be important.
- Promoting basic digital literacy for the community can be a useful investment so that no citizen is left behind. As we harness technologies, it will be good to ensure a certain level of digital readiness.
- Review of policies (regulatory framework) around content development must be considered especially for developing African content. Culture dictates how individuals acquire knowledge and ideally 60 percent should be local content. Africa should not rely on content from the Western world, but should invest in developing quality African content and African books.

Group 2: Cameroon, Kenya, Republic of Congo, Mauritius (Thematic Areas 2 and 4)

Cameroon	Kenya	Republic of Congo	Mauritius
Thematic Area 2: ICT connectivity in higher education and TVET			
<ul style="list-style-type: none"> • Decrease cost of Internet by expanding fibre optic system • Implement "E-national Higher Education Network" project • Construction of wifi networks for main state universities • Strengthen human resource capacity to operate and maintain infrastructure 	<ul style="list-style-type: none"> • Expand fibre optics broadband connectivity and National Broadband Network • Continue to develop national research policy • Increase investment in virtual workshops and labs, smart classrooms, and assessment tools 	<ul style="list-style-type: none"> • Install fibre optics and link HE, research and TVET institutions. • Set up NREN based on connected infrastructure • Require technical support to implement NREN • Needs assessment for company to match educational skill to private sector 	<ul style="list-style-type: none"> • Implementation of the ICT Plan 2030 in the education sector which includes involvement of ICT Ministry.
Thematic Area 4: Planning Ahead			
<ul style="list-style-type: none"> • Government to improve ICT legal and regulatory framework • Improve cyber security and cyber-crime prevention • Create inter-state university between Congo and Cameroon • Improve knowledge sharing 	<ul style="list-style-type: none"> • Revise policies and legal frameworks on ICT • Change curricula to reflect labor market needs and build capacity of teachers • Ensure stakeholder buy-in • Planning will be inter-ministerial • Improve collaboration between countries 	<ul style="list-style-type: none"> • Improve dialogue between stakeholders • Strengthen funding of digital education • Invest in connectivity and data processing infrastructure • Conduct needs assessment for companies to match educational skills to private sector 	<ul style="list-style-type: none"> • Develop clear action plan for investment in technologies • Increase financial assistance to universities and TVET institutions • Critical investments include infrastructure/ classrooms, labs, technologies and training

Note: HE = higher education

Commentators:

- Many countries talk about Ministries in silos. We need to begin to talk about policies from an overall point of view and look at what policies govern infrastructure. Infrastructure is critical for connectivity, especially for countries without national research networks. ICT policy should be seamless in implementation such that the ICT and Education Ministries are coherent and similar in formulation and implementation of ICT strategies (Case study: Mauritius).
- Investment in foundational infrastructure is critical and countries need to work towards free access. New technologies can be layered in incrementally as practices and teaching evolve. The lesson from Singapore's experience is that countries need not pursue cutting edge technologies before pedagogy practices catch up.
- Countries should promote PPPs to prepare for the 4IR such as interactions between NRENs and telecom providers. The data is valuable to the telecom businesses and this can help leverage free wifi access. Countries can look at examples of PPPs in Asia and Latin America.

Group 3: Mozambique, Chad, Sierra Leone, Ivory Coast (Thematic Areas 3 and 4)

Mozambique	Chad	Sierra Leone	Ivory Coast
Thematic Area 3: Using technology to transform higher education and TVET system			
<ul style="list-style-type: none"> Promote digital/ electronic platforms Extend and improve the NREN Involve stakeholders in developing local context using technology Build capacity of young people on upcoming technologies 	<ul style="list-style-type: none"> Establish fibre optics connection to network 4 universities and improve access, connectivity and training quality Build network to utilize NREN Build capacity of professors to use technology Technical assistance for M&E is required. 	<ul style="list-style-type: none"> Establish e-libraries Build capacity of teachers on use of digital technologies Evaluate feedback to improve student learning Ensure compliance with technical specifications given by ICT personnel during procurement 	<ul style="list-style-type: none"> All universities are interconnected and there is a NREN Continue training of teachers to provide online teaching Implement program of one student for one computer
Thematic Area 4: Planning Ahead			
<ul style="list-style-type: none"> Ensure development of ICT skills Upgrade bandwidth Guarantee access to technical training for youth Train more youth at Masters and PhD level in STEM Partner with private sector to ensure curriculum relevance, quality assurance and practical training 	<ul style="list-style-type: none"> Continue integration of ICT in all sectors Promote use of renewable energy (especially solar) to power ICT infrastructure Conduct institutional capacity building on digital culture and of regulatory frameworks Digitize the education system from lower levels 	<ul style="list-style-type: none"> Review legal and regulatory framework Operationalize the national research network Improve access to affordable internet for institutions Introduce basic digital skills for primary and secondary schools 	<ul style="list-style-type: none"> Address proprietary issues

Note: M&E = monitoring and evaluation

Commentators:

- Countries should consider developing local content in local languages as this would greatly improve learning.
- It is a laudable move to start at the primary and secondary levels to improve basic digital literacy.
- Incentives should be considered to encourage the adoption of new technology to improve teaching and learning. Digital Africa is not just about technology, but about helping people to use technology to improve their lives. In the same vein, subsidies should be considered to help technology become accessible to the whole population, especially the poor and elderly.
- The 4IR will promote personalized learning hence technologies like IoT have to be promoted to ensure everyone is involved.

Group 4: DRC, Nigeria, Guinea, Rwanda, Mali (Thematic Areas 1 and 4)

DRC	Nigeria	Guinea	Rwanda	Mali
Thematic Area 1: Changes in higher education and TVET courses to prepare for the 4IR and digital economy				
<ul style="list-style-type: none"> • Continue to implement vision 2050 where ICT is instrumental in education • Promote adaptive learning, courses in AI, IoT, cyber security etc. • Review curricula to ensure market orientation • Strengthen partnership with private sector with teachers from private sector • Implement e-learning and distance learning 	<ul style="list-style-type: none"> • Review curricula to meet 4IR needs • Develop courses in software engineering, network architecture, mechatronics, etc. • Develop benchmarks for minimum quality standards to include latest technologies • Adopt National Skills Qualification Framework for TVET courses • Infuse technology in teaching and learning as a tool for teachers 	<ul style="list-style-type: none"> • Provide courses for technical, cognitive and psycho-social skills for 4IR • Develop new capacities & competencies in technology • Strengthen culture of digital learning and lifelong learning • Change pedagogy to reflect 4IR 	<ul style="list-style-type: none"> • Introduce courses on AI, big data, robotics & mechatronics • Integrate critical and creative thinking • Focus on competence-based education • Promote adaptive learning • Promote industry partners through industry advisory bodies for TVET 	<ul style="list-style-type: none"> • Strengthen mechanisms for identifying skills needs and adapt curricula • Get buy-in of teachers for new curriculum and train them • Implement online learning system • Establish standards for online learning
Thematic Area 4: Planning Ahead				
<ul style="list-style-type: none"> • Prioritize education and financing for actions related to 4IR • Expand broadband connectivity • Continue use of Ubuntu alliance • Continue inter-connection of universities using electricity power line 	<ul style="list-style-type: none"> • Strengthen PPP in TVET • Review accreditation process for TVET • Strengthen skills development councils with public and private actors • Invest in digital/ICT infrastructure, networks, connectivity for institutions 	<ul style="list-style-type: none"> • Review regulatory framework • Improve access to funds to Implement national vision and strategy in collaboration with donors • Improve ICT and electricity infrastructure • Strengthen PPPs • Strengthen stakeholder buy-in 	<ul style="list-style-type: none"> • Adopt dynamic regulations to enable innovation • Use data analytics in M&E • Enhance broadband connectivity • Capacity building of teachers • Use result-based performance tools • Strengthen stakeholder involvement • Regular peer review benchmarking 	<ul style="list-style-type: none"> • Connect all higher education and research institutions by fibre optics • Create Virtual University of Mali • Provide training for teachers on use of digital content

Note: M&E = monitoring and evaluation

Commentators:

- Countries should seek partnerships with private companies to promote higher education and TVET. For example, Samsung in Lagos and Google in DRC.
- Countries must strengthen academia-industry partnerships and can promote an "earn as you learn" concept (work and continue learning) as done in Singapore
- Developing 21st century skills and adaptive competencies is extremely important, and training should foster in students the strength of resilience and adaptation.
- Applied sciences should be encouraged in higher education in Africa.
- Countries should promote use of big data analytics as it creates jobs instantly. Policies on how to use such data for jobs and wealth creation will need to be developed. A lot of data can be obtained even just by leveraging the data that governments have across Africa.

Group 5: Tanzania, Zambia, Senegal, Togo (Thematic Areas 2 and 4)

Tanzania	Zambia	Senegal	Togo
Thematic Area 2: ICT connectivity in higher education and TVET			
<ul style="list-style-type: none"> • Continue expansion of fibre optics to connect HE & TVET institutions • HE and research institutions network (HERIN) offers reliable connectivity • Supply ICT facilities for schools, teacher colleges and TVET • Enhanced partnership between HE and TVET • Adopt industry driven curricula 	<ul style="list-style-type: none"> • Strengthen ZAMREN and improve bandwidth, cost and usage. • Connect all HE and TVET institutions to ZAMREN. • Enhance private sector participation in education and training 	<ul style="list-style-type: none"> • Increase broadband bandwidth of NREN • Connect all public and private HE and TVET institutions to NREN • Develop links with international networks like WACREN 	<ul style="list-style-type: none"> • Strengthen wifi on campuses • Provide state grant to improve NREN • Connect TVET institutions to NREN • Develop infrastructure and skills
Thematic Area 4: Planning ahead			
<ul style="list-style-type: none"> • Review Education and Training policy to embrace emerging technologies for 4IR. • Develop relevant legal and regulatory frameworks • Capacity building at all levels • Develop digital infrastructure and local content • Review M&E framework 	<ul style="list-style-type: none"> • Improve legal frameworks to deploy technology better • Leverage financing to improve connectivity • Conduct policy review and stakeholder sensitization • Promote upgrading and reskilling of staff • Benchmark ICT standards in institutions • Involve PPP in learning and training 	<ul style="list-style-type: none"> • Promote and systematize new teaching methods • Reform taxes on technological services for education (computers, labs equipment, etc.) • Review cost policies of telecom providers • Involve private sector in developing HE and TVET • Train trainers and researchers to use NREN infrastructure and services 	<ul style="list-style-type: none"> • Change policy on taxes on computer hardware • Review cost policy of telecom operators • Train human resources • Review curricula to meet 4IR needs • Upgrade network to cover remote areas and schools • Centres of excellences are being established

Note: HE = higher education; M&E = monitoring and evaluation

Commentators:

- 4IR and digital technologies ambitions should be aligned to GDP aspirations of nations
- A new mindset is required to adapt for the 4IR, especially an all-of-government approach that reviews the overall system, processes and structures.
- Connectivity is vital for landlocked countries



Session 9 - Conclusions and Next Steps

During this session, speakers summarized the key take-aways and conclusions of the 5th PASET Forum and identified some next steps. Speakers also thanked the Government of Rwanda, World Bank and PASET for the organization of the Forum as well as Ministers, delegations, partners like Korea, speakers, moderators and all participants for their active participation and contributions to the fruitful discussions.



Dr. Sajitha Bashir (Adviser for Science, Technology and Innovation, Office of Global Director for Education Global Practice, World Bank)

- Digital technologies and new use of data and information will disrupt many sectors in Africa. Whether these changes are beneficial or not for people will depend on their skills.
- Africa is still lagging behind, largely being a consumer and not a producer of new technologies.
- Ministries and education actors have a major role to play to ensure the digital transformation is positive for our populations. Even having basic digital skills can make a big difference in people's lives.
- Investment and reforms in areas such as teaching and curriculum, internet connectivity and regulations, and use of technology such as adaptive and personalized learning in higher education and TVET systems will be important. More African countries need to adopt a digital skills framework to inform these investments.
- Benchmarking content in higher education/TVET with global standards as a way to constantly improve and understanding changes in the labor market by using big data analytics are some steps countries can take.
- For country action plan development, SSA countries should consider the lessons from Singapore and Korea. Action plans must focus on well-defined activities, have a clear division of roles and responsibilities, include a comprehensive budget and clear monitoring and evaluation plan.
- The Digital Economy for Africa initiative of the World Bank will put about USD 25 billion up to 2030 to support Africa's digital transformation. This give huge opportunity for countries that are ready to access it. PASET and World Bank would like to see how to mobilize additional resources to continue the process of developing and implementing the country action plans.

Prof. Aminata Sall Diallo (Executive Director, PASET Executive Board)

- The ongoing digital transformation is a critical issue for Africa. It is changing skills requirements for jobs and Africa must urgently address it to provide digital opportunities for the growing population.
- PASET is an excellent initiative for the African continent and offers an effective and flexible platform for countries to collaborate.

Dr. Jaime Saveedra, Senior Director, World Bank Education Global Practice

- The commitment from governments, private sector and civil society in Africa to ensure we follow a process to improve the quality and pertinence of higher education is laudable. Higher education will be the

locomotive to allow countries to develop opportunities for Africa faster.

- There is a huge risk as there is a large number of young people without quality basic education in Africa. Governments have a dual challenge of investing in both basic and higher education with scarce resources: to bring in frontier technologies for digital skills, while not losing sight of remaining gaps even in basic literacy and numeracy skills. Different realities and tiers of technologies coexist in our societies.
- PASET is an important platform and umbrella with several initiatives that offer different mechanisms to improve the education ecosystem In Africa.

Hon. Dr. Eugene Mutimura (Minister of Education, Government of Rwanda)

- Africa needs to continue to build skills based on innovation and adaptability for the 4IR. The Forum sessions highlighted several opportunities and emerging technologies that countries can take advantage of to address Africa's challenges.
- The country presentations and reflections demonstrated the consensus on the need to work hard and train a critical mass of scientists to develop knowledge and create technologies. That way Africa would not just be a consumer, but producer of technology in a contextual manner.
- PASET is an African initiative and all countries will work together to ensure PASET succeeds in the future. Rwanda is extremely passionate about the RSIF, benchmarking initiative, Regional TVET Initiative and other future efforts that PASET will develop.

FOR MORE INFORMATION:

On PASET, please visit www.worldbank.org/en/programs/paset or email pasetafrica@worldbank.org

On past PASET Forums, please visit www.worldbank.org/en/programs/paset/brief/knowledge-exchange

ANNEX 1 - Forum Agenda

MONDAY, MAY 20, 2019 (9:00am -5:45pm)

Room: Auditorium

07:30 - 9:00 **On-site Registration**

Session 1

PASET Progress and Introduction to the Forum

Presentation of PASET's growth and progress and possible new initiatives.

09:00 - 09:45 **Moderator:** Jost Wagner (*Managing Director, The Change Initiative*)

- **PASET's growth and ongoing initiatives.** Prof. Aminata Sall Diallo (*Executive Director, PASET Executive Board*)
- **How prepared are African education systems?** Dr. Sajitha Bashir (*Adviser for Science, Technology and Innovation, Office of Global Director for Education Global Practice, World Bank*)

09:45 **Arrival of Guest of Honour**

Session 2

Opening Ceremony

High level panel on strengthening PASET as a partnership to strengthen digital skills initiative and highlight key contributors.

10:00 -11:00 **Moderator:** Josephine Nyiranzeyimana (*Government Chief Information Officer, Rwanda Information Society Authority*)

- Hon. Prof. George Magoha (*Chair of PASET Governing Council & Cabinet Secretary of Education, Government of Kenya*)
- Dr. Jaime Saavedra (*Global Director, World Bank Education Global Practice*)
- Mr. Moongi Choi (*Director, Europe and Africa Cooperation Division, International Cooperation Bureau, Ministry of Science and ICT, Korea*)
- Hon. Dr. Eugene Mutimura (*Minister of Education, Government of Rwanda*)
- Guest of Honour: Right Honourable Dr. Edouard Ngirente (*Prime Minister of the Republic of Rwanda*)

11:00 - 11:30 **Break and VIP Group Photo**

Session 3

Fourth Industrial Revolution (4IR) and Digital Economy

Presentation followed by panel discussion to understand and discuss the global trend of 4IR and the digital economy, what are global and African experiences, and the opportunities and risks in Africa

11:30 - 12:45

Moderator: Jost Wagner (*Managing Director, The Change Initiative*)

- Dr. Kevit Desai (*Principal Secretary, Vocational & Technical Training Ministry of Education, Kenya*) - presenter and discussant
- Prof. Winston Soboyejo (*Provost ad interim, Worcester Polytechnic Institute*)

- Dr. Miriam Altman (*Director, Altman Advisory*)
- Dr. Kamau Gachigi (*Executive Director, Gearbox*)

12:45 - 14:00 **Lunch**

Session 4

How far advanced are countries in preparing their workforce

Presentations and discussion to provide Asian and African examples on how countries can prepare for the 4IR and digital economy. Government of Rwanda also presents their experience.

14:00 - 15:30 **Session 4.1 Experience from Asia**

Moderator: Tania Lozansky (*Senior Manager, IFC*)

- **Korea:** Dr. Jong Kil Park (*Professor of HRD Department at Korea University of Technology and Education; Former Deputy Minister for Employment and Labor of Korea*)
- **Singapore:** Dr. Victor Lim (*Assistant Professor, National Institute of Education, Singapore*)
- **India:** Mr. Sanjay Dash (*CEO, STEP Innovation*)

15:30 - 16:00 **Break**

16:00 - 16:45 **Session 4.2 African Country Experiences**

Moderator: Prof. Goolam Mohamedbhai (*Chair, PASET Consultative Advisory Group*)

- **Ethiopia:** Hon. Prof. Hirut Woldemariam (*Minister of Science and Higher Education, Ethiopia*)
- **Guinea:** Hon. Dr. Abdoulaye Yero Balde (*Minister of Higher Education and Scientific Research, Guinea*)
- **Tanzania:** Hon. Prof. Joyce Ndalichako (*Minister of Education, Science and Technology, Tanzania*)

16:45-17:45 **Session 4.3 Presentation by the Government of Rwanda**

Chair: Dr. Ignace Gatware, Principal University of Rwanda College of Science and Technology

- Dr. Emmanuel Muvunyi (*Executive Director, Higher Education Council*)
- Ms. Claudette Irere (*Permanent Secretary, Ministry of ICT and Innovation*)
- Mr. Patrick Nyirishema (*Director, General RURA*)
- Mr. Alex Ntare (*CEO, ICT Chamber Private Sector Federation*)

19:30 - 22:00 **Welcome Dinner at Serena Hotel**

TUESDAY, MAY 21, 2019 (8:30am - 5:45pm)

Room: Auditorium and AD 10+11+12

08:30 - 10:00

Session 5

Room: Auditorium

PASET Initiatives in Higher Education and Skills Development

Presentations, Q & A and discussions on PASET initiatives on higher education and TVET

- **Regional Scholarship and Innovation Fund (RSIF):** Dr. Moses Osiru (*Manager, RSIF Regional Coordination Unit at International Centre of Insect Physiology and Ecology (icipe)*)
- **Regional Benchmarking of SSA Universities:** Prof. Bakary Diallo (*Rector, African Virtual University*)
- **Regional TVET Initiative:** Dr. Abdiwasa Abdilahi (*State Minister, Ministry of Science and Higher Education, Ethiopia*); Kevit Desai (*P.S Technical Vocational Education, Kenya*)

10:00 - 10:30

Break

Parallel Sessions

10:30 - 12:30

Participants will separate in two groups and attend one session in the morning and another one in the afternoon. Participants will remain in country groups and in the same room.

Session 6 (in parallel with Session 7)

Room: Auditorium

Advanced digital skills and intermediate skills requirements

Presentations and discussions on the implications of 4IR and digital economy for developing advanced and intermediate digital skills.

Moderator:

AM - Safaa el- Kogali, Education Practice Manager, World Bank

PM - Javier Botero, Lead Education Specialist, World Bank

- **Advanced digital skills requirements:** Dr. Elias Towe (*Professor of Electrical and Computer Engineering, and Materials Science and Engineering, Carnegie Mellon University*)
- **Intermediate digital skills requirements:** Mr. Chao Chen (*General Manager, State Grid Corporation of China Ethiopian Branch*)
- **Skill needs forecasting for the digital economy:** Mr. Gary Gan (*CEO, JobKred*)
- **Commentators:** Prof. Winston Soboyejo (*Provost ad interim, Worcester Polytechnic Institute*); Tania Lozansky (*Senior Manager, IFC*)
- **Q&A; reflections in country groups**

Session 7: (in parallel with Session 6)

Room: AD 10+11+12

Innovations in delivering higher education and TVET

Presentations and discussions on disruptive models of delivering higher education and TVET using digital technologies and new approaches.

Moderator:

AM - Michel Rogy, Digital Development Practice Manager, World Bank

PM – Scherezad Latif, Lead Education Specialist, World Bank

- **Using personalized, adaptive learning in higher education:** Mr. Dale Johnson (*Adaptive Program Manager, EdPlus, Arizona State University*)
- **Digital Marketplace Platform:** Dr. Richard Qiu (*Senior Vice President, Global Business Development, Udemy*)
- **Distance learning in Africa:** Dr. Bakary Diallo (*Rector, African Virtual University*)
- **Commentators:** Mr. Suchit Jain (*Vice-President, SolidWorks*); Clement Uwajeneza (*Country Director, Rwanda, Andela*)
- **Q&A; reflections in country groups**

12:30 - 14:00	Lunch
14:00 - 16:00	Repetition of Session 6 and 7 (participants will remain in the same room; speakers will switch rooms and repeat the session)
16:00- 16:30	Break
16:30 - 17:45	Work in Country Groups on Action Plans - speakers available for further discussion Moderator: Jost Wagner (<i>Managing Director, The Change Initiative</i>)
19:20 - 21:00	Networking Dinner

WEDNESDAY, MAY 22, 2019 (8:30am - 1:30pm)

Room: AD 10+11+12

Session 8

Country presentations and reflections on country /regional Initiatives

08:30 - 10:00

Moderator: Prof. Crispus Kiamba

Presentations by country representatives on country action plans and comments by selected resource persons

10:00 - 10:30

Break

10:30 - 11:30

Session 8 (continued)

Country Presentations and reflections on country/regional initiatives

Session 9

Conclusions and Next Steps

11:30 - 12:15

- Dr. Sajitha Bashir (*Adviser for Science, Technology and Innovation, Office of Global Director for Education Global Practice, World Bank*)
- Prof. Aminata Sall Diallo (*Executive Director, PASET Executive Board*)
- Hon. Dr. Eugene Mutimura (*Minister of Education, Government of Rwanda*)

12:15 - 13:30

Lunch

ANNEX 2 - List of African Delegations

	Country
1	Benin
2	Burkina Faso
3	Cameroon
4	Chad
5	Congo, Democratic Republic of
6	Congo, Republic of
7	Ethiopia
8	Ghana
9	Guinea
10	Ivory Coast
11	Kenya
12	Mali
13	Mauritius
14	Mozambique
15	Nigeria
16	Rwanda
17	Senegal
18	Sierra Leone
19	Tanzania
20	Togo
21	Zambia

ANNEX 3 - List of Exhibitors

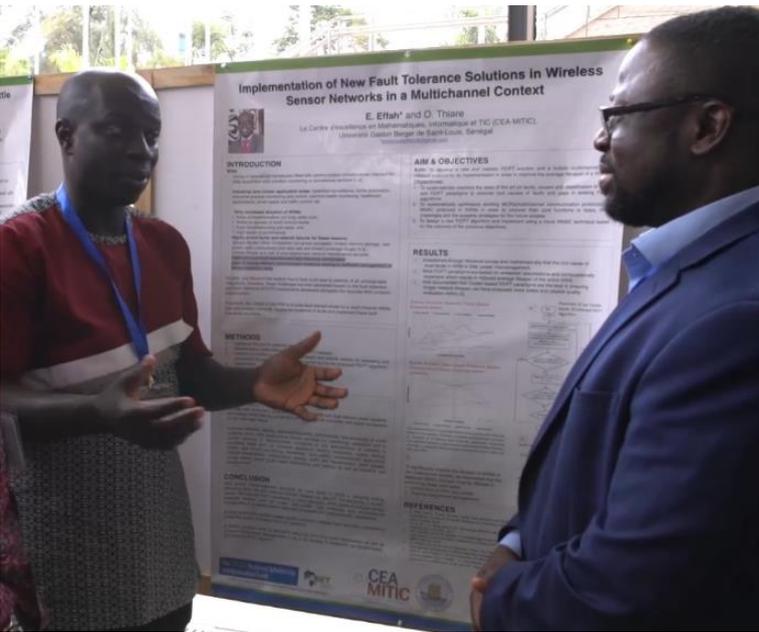
Rwandan Africa Centres of Excellence

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Step Innovations

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RSIF PhD Scholars





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