

Digital Skills in Sub-Saharan Africa

Spotlight on Ghana

IN COOPERATION WITH:



ABOUT IFC

IFC—a sister organization of the World Bank and member of the World Bank Group—is the largest global development institution focused on the private sector in emerging markets. We work with more than 2,000 businesses worldwide, using our capital, expertise, and influence to create markets and opportunities in the toughest areas of the world. For more information, visit www.ifc.org.

ABOUT REPORT

This publication, *Digital Skills in Sub-Saharan Africa: Spotlight on Ghana*, was produced by the Manufacturing Agribusiness and Services department of the International Finance Corporation, in cooperation with the Global Education practice at L.E.K. Consulting. It was developed under the overall guidance of Tomasz Telma (Senior Director, MAS), Mary-Jean Moyo (Director, MAS, Middle-East and Africa), Elena Sterlin (Senior Manager, Global Health and Education, MAS) and Olaf Schmidt (Manager, Services, MAS, Sub-Saharan Africa).

The research and report development team was co-led by Alejandro Caballero of IFC and Maryanna Abdo of L.E.K., working in close collaboration with a steering group including Tania Lozansky (IFC, Senior Manager and Head of Advisory, MAS), Salah-Eddine Kandri (Global Sector Lead, Education, MAS), Azeb-Tadesse (Senior Operations Officer, MAS Advisory-Employability) and Ashwin Assomull (Partner, Global Education practice, L.E.K.).

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L.E.K. is a global management consulting firm that uses deep industry expertise and rigorous analysis to help business leaders achieve practical results with real impact. The Global Education practice is a specialist international team based in Singapore serving a global client base from China to Chile.

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Cover Photo: Mbarak Mbiggo helps his colleagues who are software developers at Andela, in Nairobi, Kenya. Photo © Dominic Chavez/IFC

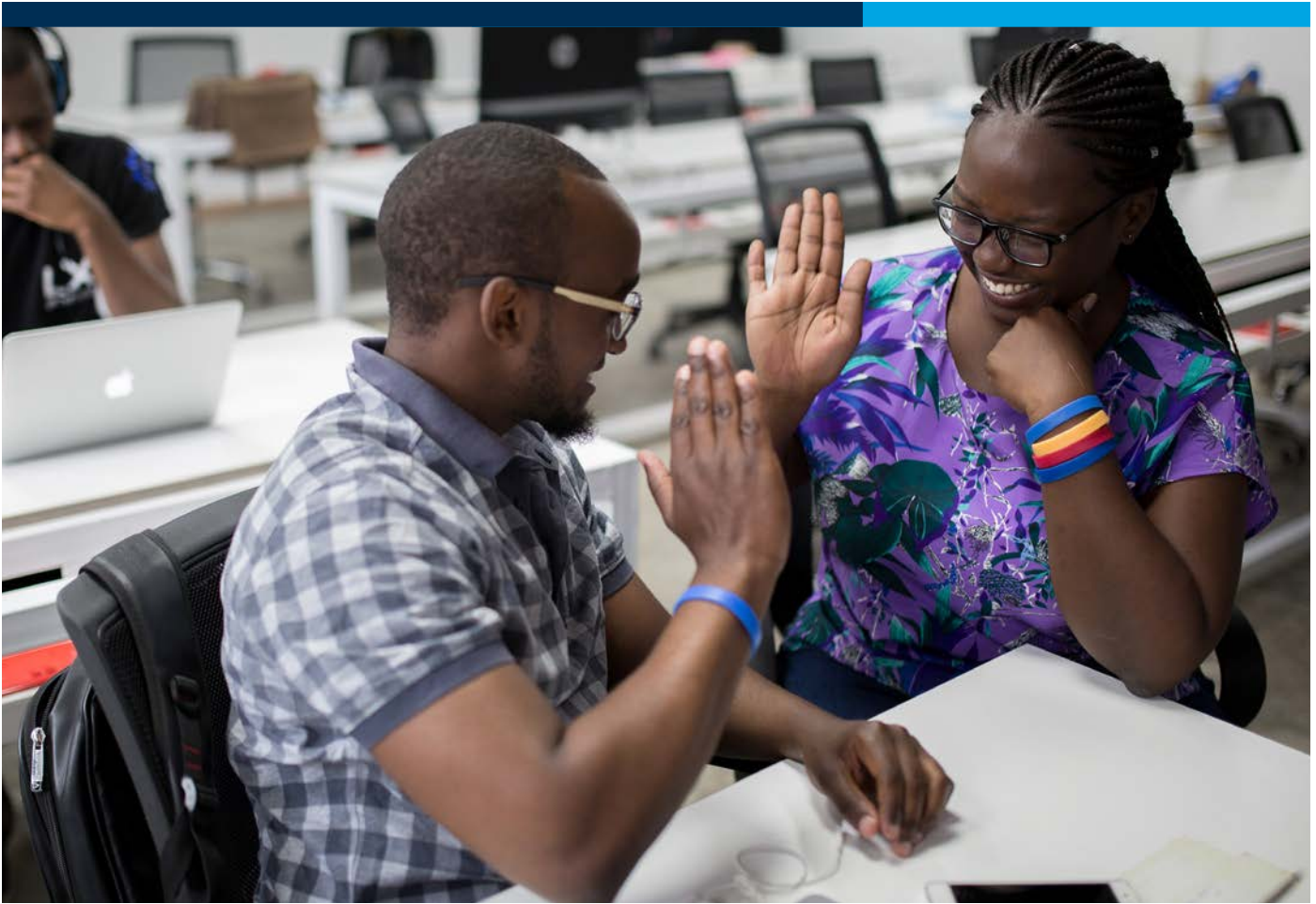


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Glossary of Acronyms

ALC	Andela Learning Community	MNC	Multinational corporation
B2B	Business-to-business	MOE	Ministry of Education
B2C	Business-to-consumer	MOOC	Massive Open Online Courses
B2G	Business-to-government	NASDAQ	National Association of Securities Dealers Automated Quotations
BIT	Birla Institute of Technology	NSDC	National Skill Development Corporation
CCNA	Cisco Certified Network Associate	OECD	Organisation for Economic Cooperation and Development
CSR	Corporate social responsibility	PPPs	Public-private partnerships
FDI	Future Digital Inclusion program of Good Things Foundation	SMS	Short Message Service
GMAT	Graduate Management Admission Test	STEM	Science, technology, engineering, and math
ICT	Information and communication technology	TCS	Tata Consultancy Services
IFC	International Finance Corporation	TVET	Technical and vocational education and training
ILO	International Labour Organization	UNESCO	United Nations Educational, Scientific and Cultural Organization
IoT	Internet of things	UNHCR	United Nations High Commissioner for Refugees
LCR	Learner to computer ratio	WiDS	Women in Data Science
LMS	Learning Management System		
MEST	Meltwater Entrepreneurial School of Technology		

Foreword

A global digital revolution is underway. Farmers check crop prices online, small business owners set up websites to reach customers, and manufacturing companies use robotics to improve speed and quality. We are experiencing a great shift in the nature of work, and the 2019 World Bank Group's World Development Report on *The Changing Nature of Work* explores how this "Fourth Industrial Revolution" is shaping the future. This report is one of IFC's contributions to the debate on Industry 4.0: a quantification of demand for digital skills in Sub-Saharan Africa and a call to action for both the public and the private sectors.

Technological advancement promises disruption across sectors, requiring more complex skills and retraining of the workforce. Commentators fret over the threat to both blue-collar and white-collar jobs from robots and artificial intelligence. But the ultimate speed and scale of this change is yet to be understood.

What is certain is that approaches to learning need to be reconsidered. Education must move from simply schooling to learning with a priority on the development of skills, such as critical thinking, problem solving, and creativity—required for jobs emerging in the twenty-first century. This goes hand-in-hand with the World Bank Group's *Human Capital Project*, which aims to accelerate the number and quality of investments in people to achieve greater equity and economic growth.

In this context, one area that has not been fully explored—particularly in emerging markets—are the digital skills that will enable people to live and work well in an era of rapid technological change. The importance of digital skills has been recognized, often as a new literacy alongside reading, writing, and math. However, there has been less pragmatic focus on the scale of demand for these skills, and the models that can be used to teach them.



The digital skills sector is ripe for private sector investment and participation.

This report, which investigates the opportunity for imparting digital skills in Sub-Saharan Africa and Ghana in particular, embodies the kind of practical, action-oriented approach that can help to drive change in economies. This is especially true in light of the United Nations Sustainable Development Goals of providing quality education, promoting decent work and economic growth, and building industry, innovation, and infrastructure. The report drills down into the perspectives of local market participants and provides data-driven insight on what skills are in demand, at what levels, and how this is expected to change. It looks to global examples of best practices and provides a compass for education providers to consider how they could capture value from the digital market opportunity.

Ghana is the first country we look to in a series of deep dive assessments of this topic. Ghana is particularly fertile ground for an exploration of digital skills for many reasons, including the relative stability of the country, which has emerged as an education hub for the region. It boasts a thriving private education sector featuring a range of models, including highly innovative homegrown institutions like Ashesi University, as well as cross-border or international institutions like Lancaster University. Ghana's digital economy also has reached a relatively advanced level of development in Sub-Saharan Africa, and it can help to illustrate potential for markets across the region to develop.

The sector is ripe for private sector investment and participation. Market participants note significant issues of undersupply of digital skills versus demand. The report illustrates a significant market size for teaching digital skills through 2030 across Sub-Saharan Africa, estimated at nearly \$130 billion with some 650 million people in need.

There are useful lessons for education providers to illustrate key trends and better understand the opportunities. Both for-profit and nonprofit private sector education providers have options for entering new markets and for models of teaching. These range from longer, advanced skills courses that train relatively small numbers of highly-skilled programmers and developers for jobs in tech, to short courses targeting large numbers of people who need basic

and intermediate job-oriented skills for work in automated manufacturing plants or within digitally-transformed services industries. Innovative models are available, with high applicability in Sub-Saharan African.

There are opportunities for education providers in these markets who may be offering job-aligned skills to expand their portfolios into digital skills, potentially in partnership with technology companies. Those offering digital training have opportunities to scale in Ghana and beyond, and those with a demonstrated track record should look particularly at business-to-government and business-to-business opportunities to provide digital skills.

At IFC, we are firm believers in the ability of Sub-Saharan Africa's economies to be at the vanguard of innovative teaching models and to address challenges common with other parts of the world. Through this report and our ongoing work to support skills development in Sub-Saharan Africa, we hope to stimulate the market for digital skills training: to make a case for others to invest alongside us, to develop models we can help to grow, and to expand the best offerings across Sub-Saharan Africa and beyond.

Sérgio Pimenta

IFC Vice President, Middle East and Africa



Executive Summary

Technology is transforming the global economy, and more change is coming. More than half of the global population will have access to technology in 2019, compared to 30 percent in 2010. Nearly 65 percent will have access to mobile phones.¹ This shift is reshaping the skills people will need to access markets, operate factories, or run their own businesses. While researchers have made numerous estimates about the impact of this skills shift, few have examined the dramatic effect on Sub-Saharan Africa. This report shines a light on the crucial need for digital skills in Sub-Saharan Africa with a particular focus on Ghana. It identifies why and how demand for digital skills is expected to evolve, the scale of and opportunity presented by that demand, and how different stakeholders —particularly the private sector—can play a role.

THE IMPORTANCE OF DIGITAL SKILLS TO SUB-SAHARAN AFRICA

Human capital is an end in itself, offering intrinsic value in terms of knowledge, experiences, health, and other factors, but this capital also equips the workforce for enhanced productivity. Investments in human capital development are critical because without them economies will fall behind. The shifting frontier for skills is essential context for the current discussion on human capital. There are two key issues: the influence of technology and automation means the future of work will look very different than the present and require a changing set of skills; but countries are faced with an unprecedented challenge of updating education systems built for another era. They must confront this reality to prepare the next generation of learners for an evolving landscape with new kinds of jobs. There is an urgent demand for skills, including digital skills and socio-behavioral skills.

KEY FINDINGS

This study finds the labor market for digital skills is already highly developed in Sub-Saharan Africa, with respondents to the digital skills survey estimating about half of jobs require some digital skills. Demand for digital skills is expected to grow at a faster rate in the region than in other global markets.

However, a significant gap in supply and demand exists across all levels of digital skills in the region, with a lower availability of skills than in other markets and significant gaps in supply of intermediate and advanced skills. The supply of digitally-skilled labor in Sub-Saharan Africa and Ghana must increase to meet anticipated labor market needs or Africa's economies will falter. Companies already are turning to talent abroad, and while governments have taken steps to integrate information and communication technology in education, the policy response has not been sufficient.

Demand for digital skills in Sub-Saharan Africa and Ghana is powered both by latent economic growth and the digitization and automation of agriculture, manufacturing, and services. The study finds that over 230 million jobs in Sub-Saharan Africa will require digital skills by 2030, resulting in almost 650 million training opportunities. An estimated \$130 billion opportunity exists to provide digital skills across Sub-Saharan Africa until 2030, with nearly \$4 billion of this in Ghana.² The largest opportunities are in business-to-business and business-to-government training for basic and intermediate skills, although there are significant opportunities in business-to-consumer training focused on intermediate and advanced skills.

Private providers, governments, and investors must consider how to tap into this demand and advance the digital skills agenda in Sub-Saharan Africa. This report's case studies demonstrate that new ways of operating are required to access this opportunity. Short courses are ideal, typically three to 12 months long, with a mix of instructional methods geared toward practical learning rather than theoretical understanding. A focus on graduate employability is absolutely critical for digital skills courses. Offerings should align with market demand and employer requirements to ensure students gain the technical and soft skills required by industry.

- **A transition in the global economy is underway that will disrupt the landscape for jobs and work.**

About 65 percent of children entering primary school today, according to one estimate, will end up working in a job that doesn't yet exist.³ The World Bank Group's Human Capital Project emphasizes the need for economies to invest in human capital—particularly digital skills—or risk falling behind in the rapidly changing landscape for jobs and skills. Automation is challenging the traditional boundaries of firms and expanding global supply chains, which may enable rural clusters to emerge that connect small and medium-sized enterprises to opportunities worldwide. Online platforms are enabling entirely new industries and redefining interactions with customers and employees. Automation is changing the demand for labor as technological advancement makes it possible for machines to do the jobs once performed by people. Technology is expected to raise the demand for labor, but the expansion of new jobs and contraction of old jobs is likely to look different across sectors. This period of change is often referred to as the Fourth Industrial Revolution, and it will have both positive and negative effects. Both low- and high-skilled workers already feel the effect, and emerging economies with a majority of low-productivity jobs are at the highest risk of disruption.

- **That makes learning new skills imperative. Different skill sets are needed for the future, with socio-behavioral skills and digital skills the most critical for success.**

Employers anticipate more than 40 percent of skills required for the workforce will change before 2022, with more than half of employees needing to learn different or more advanced skills.⁴ This will include shifts in the types of skills valued and the emergence of new skills sets, as well as a greater focus on existing skills sets that increase in importance.

The study's survey respondents named socio-behavioral skills as the most important. Many key skills for the future are related to how people work and adapt to new ways of working, rather than what they know. Researchers estimate demand for social and emotional skills, such as leadership and managing others, will grow nearly 25 percent through 2030. Employers consider a lack of these

They should also offer networking, mentorship and career advice to students that would help them transition into jobs. Both for-profit and not-for-profit models can operate in this space. Business models will vary depending on the needs of the payer, from students in business-to-consumer set-ups, to government, donors, or companies looking to build technology ecosystems or develop a talent pipeline.

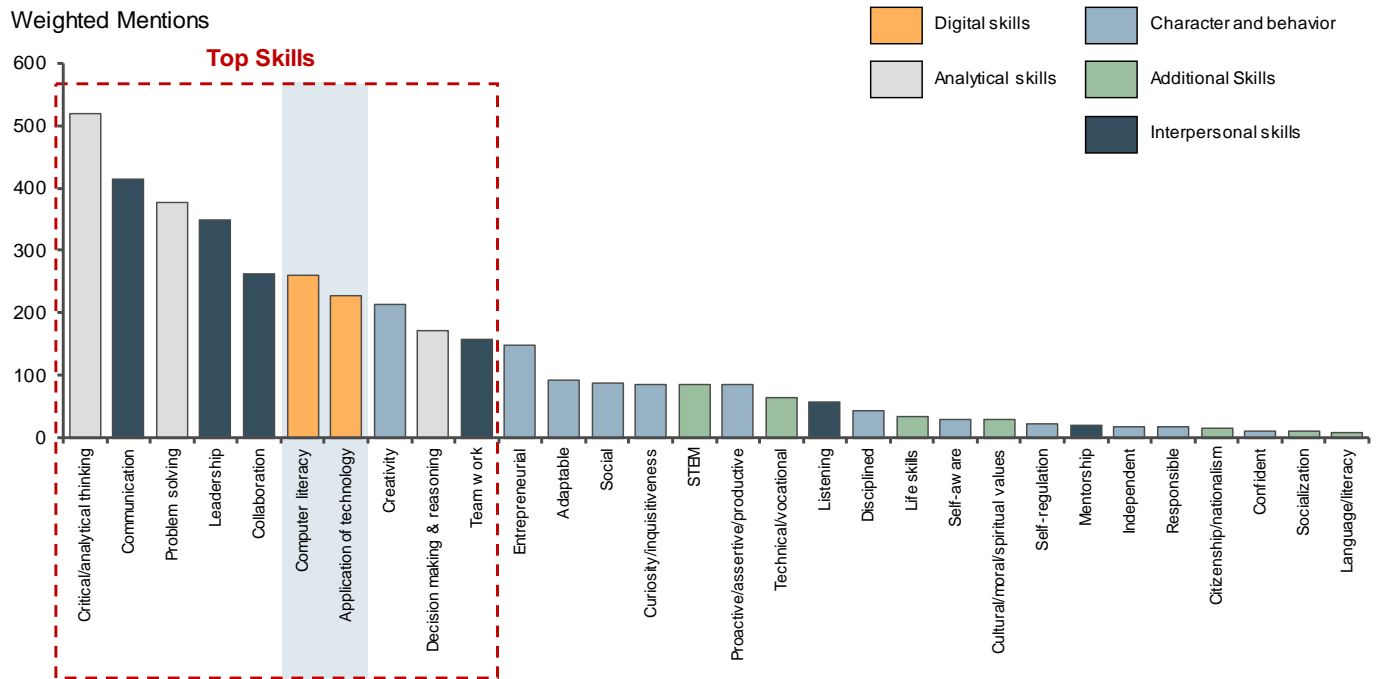
Demand is great. It will be met by education providers who see the potential of digital skills for an entire generation, current digital skills providers in Africa, education companies considering expansion in Africa, and technology companies hungry for talented workers. All of these must ensure new or expanded digital skills training is aligned to industry needs and weigh cultural contexts in different regions.

The study concludes with a call to action: the private sector must play a role in addressing the challenge in digital skills—both because of the magnitude and pace of change required, and because private sector models are likely more nimble and innovate in this rapidly-evolving area of skills. Stakeholders can meet this challenge by looking to proven models described in the report, with detailed examples of everything from recruitment approaches to job placements. The report underscores the need for these new skills to be integrated into the curriculum at an early age so the topic becomes as ingrained as reading and math.

Just as important, the future work force must cultivate twenty-first century skills: critical thinking, decision-making, teamwork... These are skills that machines cannot replicate, ones that will ensure humans can adapt and transform in a digitally-enabled future. It is essential that education systems develop curricula to teach these skills. While the private sector can play a role, the appropriate stewards to meet this challenge are public sector education systems.

The digital skills challenge in Sub-Saharan Africa is significant, but it is addressable. Whether Ghana and other Sub-Saharan African countries can take advantage of the digital opportunity to become more competitive and prosperous will depend on whether their human capital—their populations' health, skills, knowledge, experience, and habits—keeps up with this workforce transformation. Digital skills are an essential part of that human capital development and paramount to future success.

Figure 1: Skills Required for the Future Workforce, All Markets



skills as problematic, if not more, as a dearth of technical skills. Some studies show the job market already is rewarding professions that put a high premium on social skills.

Employers, according to the study, consider digital skills among the top seven skills required for the future workforce (see figure 1). Other studies built off employer interviews also note a sharp increase in demand for technological competencies.⁵ The share of jobs requiring few digital skills has fallen while the digital requirements for most jobs has increased.⁶

Observers agree on the skill types required for the future workforce and insist the current labor force lacks a sufficient supply of these skills. Demand significantly exceeds supply for almost all key skills, according to this study, with this gap more severe in Sub-Saharan Africa and Ghana, particularly in skills of critical and analytical thinking, problem-solving, and the application of technology.

This is a serious challenge given that the most important consideration for companies exploring job locations is the presence of skilled local talent. Employers view this as even more crucial than cost.⁷

- **Education systems need to change what, how, and when people learn.** Analysts agree education systems are not prepared for the pace or scale of change required to address the current technological shifts. Investments in human capital are essential, but how those investments are made will be as important as the capital deployed. These systems need to reform or risk failing to provide skills for the future. Foundational lessons should include digital skills and begin early in life. There are shifts required in three areas:
 - What people learn—to bring knowledge in line with technological changes. There is a gap between what skills education systems offer versus what economies need. Only 50 percent of countries in Africa have computer skills in the curriculum, compared with 85 percent globally.⁸

There are shifts required in what, how, and when people learn.

- *How* people learn – given that traditional pedagogical methods and infrastructure are not geared toward twenty-first century skills. Schools tend to teach digital skills by focusing on specific subjects, so digital skills are often taught in a computer course rather than embedded in the wider curriculum.
- *When* people learn – with lifelong lessons required instead of the current model of education at the start of a career. Workers need to upgrade their skills on an ongoing basis, but there are few options for doing so. Education providers still focus on traditional age groups rather than adapting to the learning styles and requirements of adults.

Sub-Saharan Africa must take on these education shifts, even as countries struggle to ensure children are learning in school. The region faces three key challenges. First, there is poor acquisition of foundational skills, with primary school learning outcomes the lowest in the world. Second, schools have limited resources, including classroom teachers and access to technology-based learning materials. Third, there is a mismatch of skills taught and those in demand; employers across Sub-Saharan Africa report that lack of access to workers with appropriate skills “is a constraint to their growth and productivity.”⁹ Stakeholders in the region will need to consider these issues as they determine the most effective way to prepare for the digital future.

The World Bank Group’s 2019 World Development Report has referred to human capital investments as a “no regrets” policy that brings potential returns to individuals, economies, and societies. Immediate action is needed to help people develop the digital skills required for the future workforce, and not just from governments but from firms as well.

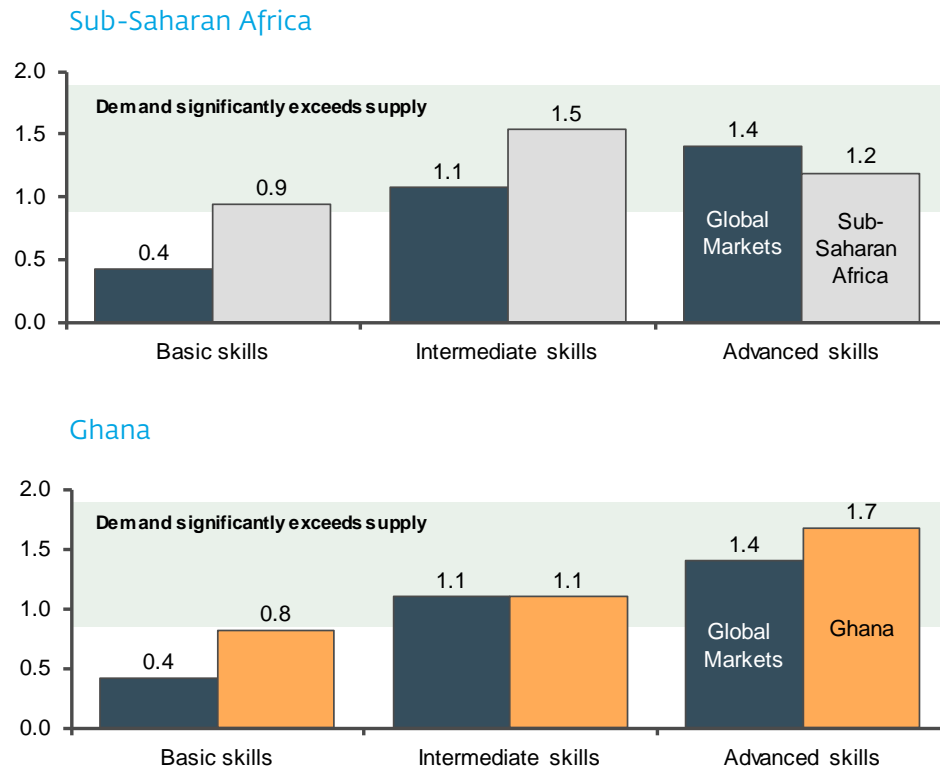
THE DIGITAL SKILLS REQUIRED FOR GROWTH IN SUB-SAHARAN AFRICA

Digital skills are central to questions about preparing children and young people for an evolving workforce. The concept of twenty-first century skills has gained traction over the past decades and denotes a range of skills, abilities, behaviors, and attitudes that are required for success in the twenty-first century. Digital skills are core to most twenty-first century frameworks and, in this study, refer to skills related to the use of technology. The report’s researchers sought to understand the demand for specific types of digital skills, the balance of supply and demand in those skills, the anticipated change in demand over time, and the market implications of any imbalance in demand and supply of skills. Key findings include:

- **Digital skills are essential to the future workforce in Africa, with basic skills most critical.** The labor market for digital skills in Sub-Saharan Africa, and specifically Ghana, is already highly developed, and demand is expected to grow. Survey respondents across all markets—including Sub-Saharan Africa—said basic digital skills, such as email communication, web research, and online transactions, are essential to the future workforce. These skills are more likely to help mobilize the growing middle class in Sub-Saharan Africa. Nearly 65 percent of individuals recruited for jobs at the African companies surveyed require at least a basic level of digital skills. Basic skills are essential, but competitiveness also will rely on the ability of Ghana’s burgeoning services sector to leverage intermediate digital skills, such as using professional software and managing data. This is reflected in the survey, since some intermediate and advanced skills, such as data analytics and artificial intelligence/machine learning, are identified among the top required skills for the future workforce. The share of employees needing more advanced digital skills will likely increase as sectors become more digitally enabled.

A demand-supply gap¹⁰ exists across all digital skill levels, but intermediate skills are of most concern in Sub-Saharan Africa (see figure 2). These are the critical career

Figure 2: Demand-Supply Gap in Digital Skills by Skill Level



skills that enable workers to undertake tasks, such as using spreadsheets, making presentations, and doing digital research and marketing. Ghana has a greater shortage of advanced skills, and the study respondents said jobs there will require more intermediate and advanced skills than those in Sub-Saharan Africa. This is because the digital needs of Ghana’s economy have progressed at a faster pace than those in the rest of the region.

- **Without growth in digital skills, Africa’s economies will falter.** Limited access to digital talent despite an anticipated increase in demand for digital skills would have serious consequences for Africa’s employers, especially with an existing supply gap. Employers in Ghana cited a range of obstacles when recruiting, including an undersupply of digital talent, a lack of relevant skills even in recruits who have had digital training, and a lack of information and communications technology equipment.

Nearly 20 percent of Ghanaian companies surveyed recruit only internationally for digital skills, largely because they cannot find skilled local talent. Informal sector companies, which comprise a majority of African employers, are even more likely to struggle to hire qualified workers, as they typically do not have the option of looking overseas. They might fail to keep pace with technology, compromising their viability and productivity. Industry participants confirm concerns that without adequate digital skills, countries in Sub-Saharan Africa, including Ghana, will fail to remain competitive. Some 80 percent of Ghanaian industry participants interviewed believe that an undersupply in digital skills would hamper expected economic growth in Ghana.

- **The policy response has not been sufficient.** While many countries in Sub-Saharan Africa recognize the importance of harnessing information and communications technology to drive competitiveness—

whether in attracting technology start-ups or bringing the power of digital technologies to established businesses—fewer have translated this into a clear-cut agenda. Ghana has been “nimble” in addressing the opportunity that digital presents, according to market participants,¹¹ and it has implemented these technologies in education policies. While these are seen as moving in the right direction, not enough is being done to invest in human capital for the digital economy.

People in Sub-Saharan Africa and Ghana need digital skills training programs to bridge the demand-supply gap and ensure employers can hire locally, find suitable training for employees, and help workers keep pace with new technology in their industries.

THE SCALE OF OPPORTUNITY IN SUB-SAHARAN AFRICA AND GHANA

There is strong demand for digital skills in Sub-Saharan Africa and Ghana. This is driven both by latent economic growth as well as the digitization and automation of agriculture, manufacturing, and services. L.E.K. undertook an extensive modeling exercise that provided a broad sizing for digital skills demand and market opportunity in Sub-Saharan Africa and a granular, detailed sizing for digital skills in Ghana. These are the key findings:

- **There will be 230 million “digital jobs” in Sub-Saharan Africa by 2030.** This will translate to nearly 650 million training opportunities by 2030, including required retraining.¹² The drivers of demand for digital skills vary across sectors and in the formal and informal economy. Digital technology allows farmers to get better information, including from the government, which can improve agricultural productivity. They also need digital skills to access insurance, savings programs, and credit to buy farm tools. Demand for digital skills also is likely to increase in industrial sectors because technology can help mitigate the dangers of physical jobs, and tools such as online videos and text messaging can support training and communication on the job. The services industry has the highest anticipated levels of digital skills requirements.

Changes in customer demand and behavior drive market competition, from expectations that hotels will have websites to demand for easier shopping and faster parcel delivery.

- **The largest need for Sub-Saharan Africa digital skill is in business-to-business and business-to-government training.** Educational products and services are typically provided in one of three ways: business-to-business, business-to-government, or business-to-consumer. Business-to-business models involve the sale of products or services to institutions, such as schools, corporate entities, or education providers. Business-to-government models involve the sale of products or services to local or national governments, while education business-to-consumer models are intended for consumers, with products typically purchased by students and parents.

Most of the region's digital skills need is in basic and intermediate digital skills training to get people job-ready and retrain them over time. Basic digital skills training programs are unlikely to be viable for business-to-consumer models, though, as people are unlikely to pay for courses. A majority of survey respondents believe digital skills are core lessons that should be taught in school, so basic skills training programs are unlikely to make money by charging consumers. By contrast, advanced skills courses have a strong incentive for the consumer: increased wages. Nearly 50 percent of survey respondents believe pre-employment training and post-secondary education are the best avenues for acquiring intermediate and advanced digital skills. The implication is business-to-consumer opportunities are available for providers offering advanced and some intermediate skilling, while business-to-business and business-to-government models will dominate basic and most intermediate skills.

- **The revenue opportunity size across Sub-Saharan Africa in digital skills is \$130 billion through 2030.** Potential business-to-business and business-to-government opportunities in Sub-Saharan Africa will

encompass about 625 million people who require digital skills by 2030 and result in nearly \$120 billion in revenue. Business-to-consumer opportunities will comprise about 25 million people in need of digital skills through 2030 and \$11 billion in revenue.

- **Ghana alone will offer 9 million digital jobs and nearly \$4 billion in revenue potential through 2030.**

Numerous sources are confident there is “substantial scope”¹³ for the information and communication technology sector to grow amid continued demand for digital skills in the labor force. Nine million jobs requiring digital skills in 2030 will translate to nearly 20 million training opportunities through 2030. That will mean business-to-consumer opportunities for about 700,000 people who need digital skills through 2030 and \$320 million in revenue. Ghana could have business-to-business and business-to-government opportunities that reach about 18 million people who require digital skills through 2030 and nearly \$3.5 billion in revenue.

The market for digital skills across Sub-Saharan Africa and Ghana over the coming decade is significant. While transformation will come more quickly to the formal economy, the informal economy is also rapidly influenced by technology and citizens will feel the impact across agriculture, industry, and services. Private sector training providers—whether universities, skills providers, boot-camps, or business-to-business curriculum providers—have the chance to develop offerings that tap into the growing demand for digital skills. There is a large market opportunity for business-to-business models, particularly focused on basic skills. Investors and operators in Sub-Saharan Africa and Ghana also have a compelling reason to embrace business-to-consumer digital skills, focused mainly on intermediate and advanced skills.

TRAINING MODELS FOR DIGITAL SKILLS

Stakeholders, including investors and employers, can take a variety of actions to manage the demand-supply imbalance in digital skills in Sub-Saharan Africa and, specifically, Ghana. Some of these interventions will take the form of training,

There will be 230 million “digital jobs” in Sub-Saharan Africa by 2030.

while other actions will include ecosystem-building that contributes to broader development. The urgency of the digital skills gap in Africa’s labor markets makes it critical to ensure providers implement effective digital skills training programs. Traditional models are failing the world’s young people; almost two-thirds of youth employment programs have no impact.¹⁴ How can digital skills be effectively taught, and what business models are available? Researchers conducted in-depth studies of eight global and regional programs to understand how to best design and deliver such courses. These case studies reveal important aspects about the fundamentals of operation, student selection, quality and relevance of training, funding models, and scale. Key case study findings include:

1. **Transformation of lives and employment prospects is the animating mission for most organizations.** The organizations assessed see the learning of digital skills as a transformative process with the potential to improve individual lives and communities. Many cite the need to meet a skills gap as a major driver for setting up the program and identify this as an issue for both job-seekers and employers.
2. **Reach is tied to delivery mode and type of skills taught.** Prospective digital skills providers should consider their impact and revenue objectives when planning for reach. Anudip provides basic skills lessons and has taught nearly 85,000 participants since 2007. Good Things Foundation leverages a network of Online Centres to teach basic digital skills and has reached 2 million people. Udacity has 70,000 annual participants in its four to six-month industry-aligned Nanodegree programs, which are delivered online.

Table 1: The Digital Skills in Sub-Saharan Africa Case Studies

This report demonstrates how digital skills providers can develop sustainable business models at basic, intermediate, and advanced levels across emerging and developed markets. They vary in scale and stage of development, but each provides insights on models that drive access to digital skills. These companies include:

Organization	Skills imparted	Geographies covered
ANDELA	Advanced	Kenya, Nigeria, Uganda, with administrative offices in the United States
ANUDIP	Basic, Intermediate, some Advanced	India
DEVELOPERS IN VOGUE	Intermediate, Advanced	Ghana
DIGITAL HOUSE	Intermediate, Advanced	Argentina, Brazil
GOOD THINGS FOUNDATION	Basic	Australia, Kenya, United Kingdom
MEST	Advanced	Across Africa with particular focus on Ghana, Nigeria, Kenya, South Africa and Côte d'Ivoire
MICROSOFT 4AFRIKA	Intermediate, Advanced	Across Africa with on-the-ground presence in Nigeria, Ghana, South Africa, Egypt, Uganda, Kenya, Rwanda, Mauritius, Malawi and Ethiopia
UDACITY	Intermediate, Advanced	190 countries

3. Programs are typically shorter than most degrees.

Program lengths tend to vary, although average digital skills training lasts less than a year. Intermediate and advanced training courses typically range from three to 12 months, with additional time for internships or job placements. Post-secondary degrees, in comparison, usually cover 36 months or more of training. In the industries with the highest demand for digital skills, students and employers prefer on-the-job training and programs that have a rapid route to employment. Prospective digital skills providers in Sub-Saharan Africa should plan for courses that fit within a one-year timeframe or less.

4. Selectivity increases with the level of skills offered.

Basic skills courses are open to everyone, while advanced courses have barriers to entry and, in some cases, an acceptance rate as low as 1 percent. They use a multi-pronged selection process that can include an application form, online assessment, group interview, or one-on-one interview. Prospective digital skills providers in Sub-Saharan Africa should look to match the selection process with their goal for the program. Those targeting an elite corps of developers will require rigorous, lengthy and highly selective approaches, while those looking for less experienced, but enthusiastic, participants will require approaches that focus more on personal commitment and fit. Basic skills providers may offer open admissions

without an application process. This sometimes reflects the lower marginal cost of additional participants and often is part of the organization's mission.

Programs also focus on ensuring a strong representation of people from diverse backgrounds—especially ones underrepresented in technology—with a focus on gender, economic, and geographic diversity, and inclusion of socially marginalized groups.

- 5. Soft skills are core to most programs.** Many courses teach broader career skills and emphasize the importance of soft skills in finding jobs, an effective complement to more specific digital skills training. These lessons prove an essential ingredient of most digital skills courses in Sub-Saharan Africa, particularly at the intermediate and advanced level. Non-technical skills taught include interview preparation, interpersonal skills, and character traits. Developers in Vogue focuses on teaching students public speaking skills, presentation, and networking skills essential for the interview process. Interpersonal skills involve communication, leadership, collaboration, and teamwork and are taught through interactive group projects, peer-to-peer learning, and simulated workplace scenarios. Andela judges its fellows by six parameters, four of these—initiative, communication, professionalism, and integration—are interpersonal or team skills. Anudip has a separate team of staff that focuses on providing soft skills training, a testament to the importance placed on interpersonal skills. These programs consider character traits such as creativity, entrepreneurship, proactivity, adaptability, and curiosity as valuable qualities in the digital workplace. Digital House focuses on teaching creativity as one of its twenty-first century skills, while the Meltwater Entrepreneurial School of Technology seeks to develop leadership skills in its cohort.
- 6. Delivery models vary in approach depending on the skill level taught.** Prospective providers should consider what configuration of instructional methods aids learning goals, ensures retention, and optimizes costs. Online instruction is used across most programs, alongside classroom teaching. Digital House students who

participate in its blended courses have a flipped classroom experience where they learn theory at home online. Classroom instruction usually serves as the foundation of most advanced skills programs as it allows for a greater transfer of knowledge. Project-based learning is a widely used method, particularly in intermediate and advanced courses, that allows students to apply their lessons and “learn by doing.” 4Afrika's AppFactory students gain real-world experience by working with senior software engineers on a project for a partner organization. Similarly, Udacity's Nanodegree students receive feedback from industry participants and work on projects designed by experts. Self-led learning offers students an opportunity to develop proactive habits and independent thinking, while peer learning is used by programs to reinforce lessons and encourage interpersonal skills.

In-person training is the predominant method for teaching advanced digital skills. This is because face-to-face, practical instruction is often required to convey complex ideas: 70 percent of the case studies that offered in-person training taught advanced skills, while only 30 percent taught basic skills.

- 7. Scale is driven by three key factors: delivery efficiency, partner networks, and employment orientation.** Delivery efficiency implies lower costs to serve each participant. This decreases the investment required to expand reach and can draw a larger audience. Udacity's wholly online platform maintains a low cost-per-student while also extending its reach globally. Partner networks help to decrease the time and resources required by programs. They can help provide organizations with support on curriculum development, physical resources and hardware, trainers and mentors, and potential employment opportunities for students. 4Afrika taps into Microsoft's large partner network to expand its AppFactory program and find trainers. Good Things Foundation has developed training content, including the online Learn My Way platform, which can be easily distributed across a wide range of partner centers. A clear employment orientation that provides students with up-to-date, market-aligned training is critical in

helping graduates find jobs. It also boosts the organization's reputation and increases funding opportunities. Challenges for scaling include finding suitable participants, securing skilled faculty, building industry partner networks, and maintaining programs' market alignment.

8. **Program success is tied to the practicality and industry-alignment of programs.** Students cited three key factors that drive program success: hands-on training that accelerates learning, staff with practical experience who can teach by example, and current links to industry.
 - a. **Hands-on experience:** Organizations used multiple methods to simulate business activities and give students a hands-on experience. Developers in Vogue students work on hackathons to test their coding skills under pressure, while MEST students develop and build a business idea that they pitch to investors at the end of the program.
 - b. **Faculty with practical experience:** Digital skills are inherently practical, and staff who can teach by example and understand business applications for these skills can ensure their relevance to market needs. Digital House instructors bring deep experience in professional, entrepreneurial, and research fields.
 - c. **Alignment and links to industry:** Programs can provide ties to industry through curriculum that ensures the skills taught match demand, guest lecturers who help connect the classroom to the broader industry, campus visits, and networking events that help students put their learning in context. Anudip leverages its industry ties by asking potential employers to design program curriculum and conduct the training program.
9. **Employability is a core focus for most programs.** The most common ways to support student links to the job market are industry networking and partner placements. Microsoft's network of around 1,200 partner organizations in Africa provides internship opportunities that are beneficial for participants and placement organizations.

These partner organizations host interns and offer successful students permanent roles in their companies. Andela's program has employability embedded in the model given that, after a six-month training period, fellows are staffed as full-time team members at one of Andela's offices. Digital House students and graduates have access to an online jobs board that includes full-time and part-time opportunities in technology fields with more than 1,000 companies posting their job needs. Employability-focused training programs also use industry mentorship as a way to support learners when the program ends. Many programs cultivate more than one mentor relationship to offer different benefits to students.

10. **Operators should start with the needs of potential payers when considering business models for digital skills training.** Programs observed include private for-profits, not-for-profits, and corporate supported programs. Payers are made up of individuals, corporations, a corporate and government mix, or a blend of government and donors. Each of these stakeholders has unique needs, and potential interventions vary based on those requirements. Providers keen to offer business-to-consumer training must ensure they are boosting an individual's employment prospects, typically in the form of payback on training investments. Andela, for instance, provides free training to its students in return for a 3.5-year employment commitment with the company. Programs working with government or donors may need to demonstrate either economic impact or social and economic inclusion outcomes, or both. Prior to founding Anudip, Dipak Basu conducted a study that demonstrated increasing local employment can significantly enhance the lives of marginalized people. The organization has grown with the support of institutional donor funding.

RECOMMENDATIONS FOR STAKEHOLDERS

Government, donors, and investors have key roles to play, along with those who would like to directly offer digital

Teaching digital skills is not only a business opportunity, but a chance to reconceive the future of work across the continent.

skills. Businesses can also partner with existing training providers to meet their training needs. Doing so is not only a business opportunity, but a chance to reconceive the future of work across the continent.

- African education providers that currently offer digital skills can expand to take advantage of the opportunity in the region. Proven business-to-consumer providers should look to the business-to-business and business-to-government opportunity, which has potential for growth. If the provider wants to support marginalized or underrepresented groups, it has a greater likelihood of impact-investing finance and donor or government support.
- African education providers that do not currently offer digital skills should consider developing new course offerings with different modes and duration of courses. Existing vocational and higher education providers are well positioned to expand into digital skills but should understand the need to move from theoretical to practical training approaches and to create shorter courses that lead to jobs. Institutions should ask prospective employers about the skills they need and the number of people to do them before embarking on program designs, and then partner with these employers to create job placements and help with course design. Providers should consider how to integrate digital skills throughout their curriculum. Education providers without digital skills expertise should think about acquiring some as technical knowledge and industry insight will shape the success of new programs.

- Digital skills providers outside of Sub-Saharan Africa who seek to enter the continent's markets should identify those with a strong unmet demand for digital skills and a reasonably high ease of doing business. Joint ventures with local technology or education companies would be a sensible route to market entry. Overseas providers should also consider modifying business models to accommodate local students, such as adjustments to course configurations to match student payback periods, and adjustment of course timings or a mix of remote and in-person learning to match student preferences around pace and place of learning.
- Technology companies have a role to play in supporting the development of the ecosystem and aligning public and private sector digital skills with the latest industry standards. They also can play a role as direct digital skills providers through expansion of online courses and certification opportunities.

LOOKING AHEAD

The report makes three main observations. First, urgent action is required to address the challenge in digital skills and the private sector must play a role. Investments in human capital can help economies to weather these transitions and to ensure their competitiveness in the future. The market opportunity for private sector education is significant. In expanding these offerings, private providers will be able to secure not only healthy financial returns, but also improve the competitiveness of Sub-Saharan Africa and the life chances of its people.

Second, stakeholders can address this challenge with proven models that can be replicated and scaled. There are successful models for digital skilling, both in Sub-Saharan Africa and beyond, with potential to offer lessons for providers who want to enter the market. Many programs assessed for the study are actively seeking investment or opportunities to partner. There is a need for a consortia of providers and investors to support models that have strong potential for impact and growth, those that can go from 100 students to 1,000 and eventually to 100,000.

Finally, foundational skills taught in school must include basic digital skills at a minimum. Digital skills are now considered as essential for the future of work as reading and writing. While the private sector can play a role, the appropriate stewards to meet this challenge are public sector education systems that are equipping this new digital generation and investing in their countries' human capital.

The digital skills challenge in Sub-Saharan Africa is significant, but it is not insurmountable. Ghana reveals the potential that exists, particularly for the private sector. Ghana, and other Sub-Saharan African countries, must take advantage of the digital opportunity to increase competitiveness, prosperity, and inclusion. This will help ensure they not only keep up but thrive in a new era of work.



People using computers in an internet cafe in Kampala, Uganda. Photo: Arne Hoel / World Bank

Research Approach

Technological advances are redefining global labor markets, carrying significant implications for government and business. These topics are examined in the World Bank Group's 2019 World Development Report on *The Changing Nature of Work* and in a host of other recent studies on the future of work and shifting labor market requirements in the digital age. This research also should be considered within the context of the World Bank Group's focus on human capital development to fuel prosperity and competitiveness, including the recent *Human Capital Project*.

While numerous studies focus on the future of work and Fourth Industrial Revolution now underway, their long-term impact on emerging markets is less clear. The digital future of work brings tremendous opportunities for growth and prosperity, but its success hinges on countries' abilities to meet new industry needs. Most research has focused on the implications of this shift for developed markets. Fewer studies have examined the effect on Sub-Saharan Africa. It is imperative that the region, which has the largest youth population in the world, builds the skills and expertise to drive competitiveness in the future.

Young people in Sub-Saharan Africa do not, by and large, have access to the digital tools and learning opportunities available to their counterparts in richer economies. Countries like Ghana, which is the key case study for this report, have the potential and explicit ambition to become global digital hubs. Ghana and other ambitious Sub-Saharan African nations—Nigeria, Senegal, to name a few—must prioritize the development of digital skills to sustain economic growth and deliver on an agenda to embrace the digital age.

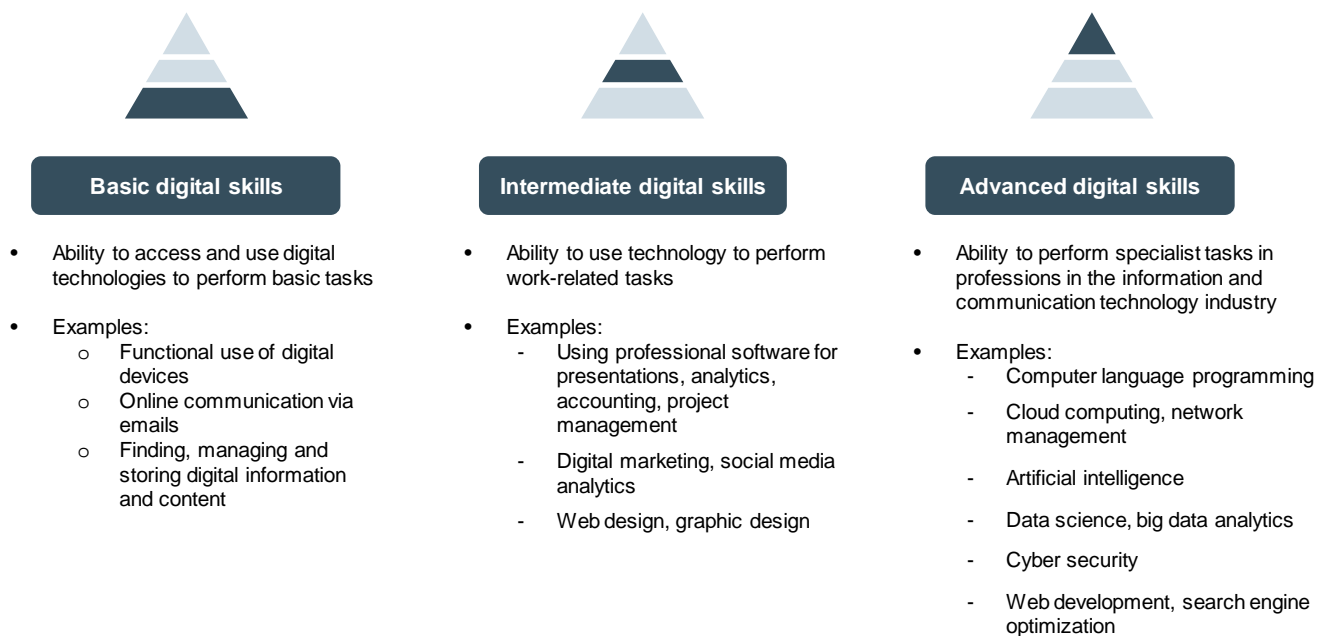
Structure of the Report

This report is structured in four chapters that start by exploring the global context for skills, then turn a lens to Sub-Saharan Africa, with Ghana's experience investigated in chapter 3. The potential interventions for digital skills

providers are explored in the report's final chapter. The chapters are set out as follows:

- In *Chapter 1: A Shifting Landscape for Skills*, the report explores the future of work, and what key skills are required to meet the needs of the workforce of the future. The chapter examines the skills gap and the challenges it presents for education systems globally, with a spotlight on learning in Sub-Saharan Africa.
- In *Chapter 2: Digital Skills in Sub-Saharan Africa and Ghana*, the report explores what digital skills are and how they fit into wider conceptions of skills. It then examines perspectives from market participants (globally, in Sub-Saharan Africa, and in Ghana) on the digital skills most required in the market, the availability of those skills, whether and how demand is expected to grow, the implications for the economy, and policy issues in Sub-Saharan Africa and Ghana surrounding digital skills.
- In *Chapter 3: Understanding Demand for Digital Skills in Ghana*, the authors explore digital skills in Ghana from the perspective of employers in the country's key sectors: agriculture, industry, and services. The report identifies the likely requirement for digital skills in Ghana by 2030, using projections of labor market growth and current and future estimates of digital skills needs. This requirement for digitally-skilled labor is then translated into a market size categorized by different levels of digital skills, as well as by business-to-consumer, business-to-government or business-to-business opportunity. An estimate of the digital skills opportunity for Sub-Saharan Africa is also provided. The report does not address supply of digital skills in Ghana or map the landscape for Ghana's digital skill provision.
- In *Chapter 4: Closing the Skills Gap: Insights from Global Innovations and Best Practices*, the report looks to examples of global and Sub-Saharan African digital skills efforts to understand how to effectively teach digital skills. The

Figure 3: Basic, Intermediate, and Advanced Digital Skills



authors investigate drivers of viable business models and programs that offer the greatest value to students. The chapter also explores challenges to growth.

Data and perspectives from Ghana are interwoven throughout the report with outside perspectives on global and Sub-Saharan African digital skills opportunities. Ghana is more closely investigated in the chapter 3 market sizing exercise.

The Report's Definition of Digital Skills

In chapter 2, the authors provide a definition of digital skills, which is summarized here (see figure 3). The United Nations Educational, Scientific and Cultural Organization's report, *Digital Skills for Life and Work*, presents a strong grounding for investigations of digital skills and the authors used the learnings of that research in this work.

- **Basic Digital Skills** are "entry-level functional skills required to make rudimentary use of digital devices and applications."¹⁵ With basic digital skills, users are typically able to operate devices like computers and smartphones,

access and store information from online resources, and set up online accounts and profiles.

- **Intermediate Digital Skills** enable individuals to use digital tools for more significant task-oriented purposes. Intermediate skills are "the skills that enable an individual to make substantive and beneficial use of online applications and services," while the Organisation for Economic Co-operation and Development defines them as a set of generic information and communication technology skills that can be utilized to complete tasks.¹⁶ They are often required for professional growth and are applicable to a range of job profile requirements.
- **Advanced Digital Skills** allow people to use technology in transformative ways. UNESCO defines these as "the group of skills that form the basis of specialist [information and communication technology] occupations and professions."¹⁷ These occupations include, but are not limited to, computer programmers, artificial intelligence experts, and data scientists.

Study Approach

The study draws on prior reports and investigations on education and digital skills globally, particularly in Sub-Saharan Africa. New research undertaken includes the following:

1. **Global Digital Skills Survey:** The survey, undertaken between October and November 2018, explores the demand for skills in the future workforce and then drills down into demand for digital skills (across basic, intermediate, and advanced levels). It also looks at how this is expected to change and explores viewpoints on hiring for digital skills. Findings provide readers with up-to-date market perspectives from more than 150 executives, of whom nearly 60 percent are in Sub-Saharan Africa. Roughly half of this group is based in Ghana. Participants include those on the supply side (about half of respondents' organizations are in the education sector) and demand side (typically human resources managers of Ghanaian companies). The appendices include the full list of survey questions, as well as a section on the methodology for analyzing the survey.
2. **Digital Skills Demand Model:** This aims to capture the size and nature of the market opportunity for digital skills in Ghana through 2030. The model for estimating the market was built around five key drivers of growth:
 - a. The expected growth rate of Ghana's gross domestic product and the contribution of different sectors of the economy
 - b. The anticipated change in Ghana's informal labor force
 - c. The labor requirements in Ghana to achieve economic growth in 2030
 - d. Expected demands for digital skills in agriculture, industry, and services (in terms of percentage of employees requiring these skills)

These drivers offered a headline market size for jobs requiring digital skills in 2030, from which the number of digital skills opportunities were derived. Revenue potential was determined separately for both business-to-consumer and business-to-business/business-to-government models of digital skills training. Projections for digital skills demand assume growth rates for the economy in line with current projections. Research suggests Ghana's future competitiveness could be compromised if it does not sufficiently ensure its population learns digital skills, although these scenarios have not been explored here.

3. **Case Studies of Best Practice:** Insights on best practices are gleaned from case studies of digital skills training organizations. Report authors chose eight programs to profile in depth from 162 organizations. An appendix of these case studies is available for review, as well as summary lessons provided in chapter 4. Researchers selected programs based on factors that included scale, employment focus, innovation, and impact. Case study analysis resulted in insights on the skill-level imparted, typical learner profile, path to scalability, and business model, among other areas of focus. Conclusions drawn from this analysis will serve providers looking to spread digital skills in a scalable and sustainable way. There are also several shorter case studies featured throughout the text that highlight good practices for imparting digital skills.
4. **Decision-making Framework for Digital Skills Training Providers:** The framework presents a range of strategic options to potential digital skills providers. Both public and private operators can navigate the framework by identifying the main potential payers and determining their specific needs. Trainers can explore potential interventions, relevant skills to focus on, and design implications to help determine program configurations. Researchers incorporated findings from the global digital skills survey and case study analysis into the framework.

1. Context: A Shifting Landscape for Skills

- Advancements in technology are spurring the Fourth Industrial Revolution, driving a significant shift in the skills that will be required for the future workforce
- There are different skills needed for the future, with socio-behavioral and digital skills critical for success
- The current labor force lacks sufficient supply of the skills identified as important for the future workforce, with this demand-supply gap wider in Sub-Saharan Africa than other regions
- Education systems need to reform or risk failing to provide skills for the future. There are changes needed in what, how, and when people learn
- Sub-Saharan Africa must embrace these education shifts even as countries struggle to ensure children are learning in school
- Investment in human capital is a “no regrets” policy

INTRODUCTION: THE IMPORTANCE OF HUMAN CAPITAL

The World Bank Group’s *Human Capital Project* aims to help countries achieve better human capital outcomes by prioritizing investments in people. This project is a key part of the organization’s efforts to end extreme poverty by 2030 and raise the incomes of the bottom 40 percent of people in each country.

Human capital is a population’s health, skills, knowledge, experience, and habits. These are ends in themselves, offering intrinsic value, but they also drive productivity and equip the workforce. Countries often underinvest in human capital, in part because it may take time for these investments to pay off and they are more difficult to measure than physical investments.

Investment in human capital has the potential to produce significant impact. These include benefits to individuals, who will experience average returns to schooling of about 10 percent for each additional year of education;¹⁸ benefits for economies, which show that at least 10 percent and 30 percent of differences in per capita income between countries is attributable to human capital alone; and benefits for societies, because education supports people to behave in a more trusting and tolerant manner, which then drives further economic benefits.¹⁹

The shifting frontier for skills is essential context for the current discussion on human capital. This frontier is moving rapidly and bringing both opportunities and risks.

Governments, organizations, and individuals face a widely-recognized set of interrelated challenges. In the last decade,

multiple studies from the donor, investment, advisory, and think tank communities have highlighted the same issues:

- The influence of technology and automation means the future of work will look very different than the present—implying demand for a changing set of skills; and
- Countries are faced with an unprecedented challenge of re-imagining and overhauling outdated education systems built for another era, typically for the Industrial Revolution in the nineteenth century. They must confront this reality to prepare the next generation of learners for an evolving landscape of new skills, jobs, and technological changes.

The section that follows explores these topics, with an eye to both the global context and to Sub-Saharan Africa and Ghana.

KEY SHIFTS IN THE JOBS AND SKILLS LANDSCAPE

Technology is reshaping almost all aspects of our lives. It is connecting more people with global markets and changing patterns of production and consumption around the world. Automation is re-envisioning industries and services. This period of change, often referred to as the Fourth Industrial Revolution, promises significant shifts in the way technology shapes sectors, society, and even biology. Parts of Sub-Saharan Africa may not have fully realized the benefits of the Second and Third Industrial Revolutions. They face an opportunity—albeit a difficult one—to leapfrog this past and complete in a new era of accelerated technological change.

These shifts are already beginning to influence the types of jobs and skills required in the market, and there is more change anticipated. About 65 percent of children entering primary school today, according to one estimate, will end up working in a job that doesn't yet exist.²⁰ The advent of these wholly new jobs will also coincide with the decline of obsolete ones.

Some of the key shifts influencing the landscape for jobs and skills include:

- **Increasing Access to Technology:** In 2019, 55 percent of the world's population is expected to have access to technology, up from 30 percent in 2010. The rates of mobile phone penetration are higher, at a projected 63 percent in 2019.²¹ While emerging markets are still less connected than developed markets, it is expected that this gap will narrow. Sub-Saharan Africa now has 22 percent Internet penetration and 44 percent mobile penetration.²² Ghana has 35 percent and 67 percent.²³ Internet penetration is expected to grow to 40 percent in Sub-Saharan Africa²⁴ by 2025 and 58 percent in Ghana by 2030.²⁵

The technology to which people now have access is rapidly improving. Growth of the global technology sector is also a key source of jobs, as technician, developer, and engineering roles grow alongside the industry.²⁶

- **Disruption of Production Processes:** Technology challenges the traditional boundaries of the firm and expands global supply chains, enabling rural clusters to emerge that connect small and medium-sized enterprises

“It is only a question of pace and time. We are seeing things change steadily and that will only pick up as we see more connected technologies interacting with each other.”

– Kami Viswanathan,
Founder of work4.ocalpital

to global opportunities.²⁷ Technology also allows firms and production processes to scale up or down quickly, which can blur the boundaries of companies and change their demand for labor, from full-time, year-round labor to project-specific requirements. This illustrates why wider learning of even basic digital skills can have real economic impact.

- **Emergence of Online Platforms Enabling**

Entrepreneurship and Gigs: Marketplaces are dynamic and global. From platforms that enable short-term gigs to channels like YouTube or Etsy that support artists, influencers and entrepreneurs, online work platforms now make it easier to complete tasks or participate in markets.²⁸ Businesses are expected to continue to expand their use of task-specialized contractors, potentially through decentralized operations.²⁹ These changes will have an uncertain impact on unofficial jobs: some individuals may engage in contracts with formal sector companies, while others are likely to work more casually or off-book.

- **Shifting Frontier between Work Tasks Performed by People and those by Machines:**

Automation is changing the demand for labor as technological advancement makes it possible for machines to do the jobs once performed by people. As this frontier shifts, so do global labor markets.³⁰ Technology is expected to raise the demand for labor, but the expansion of new jobs and contraction of old jobs is likely to look different across sectors.³¹ In South Africa, researchers estimated that 41 percent of all work activities could be automated, while in Ethiopia, Nigeria, and Kenya, this is 44 percent, 46 percent, and 52 percent, respectively.³² Some jobs likely will disappear and others will become more highly valued depending on the industry.³³ It is also the case that “most automation occurs at the level of specific work tasks, not at the level of whole jobs.”³⁴ Many projections about labor market changes tied to automation quantify the change in percentage of hours worked as opposed to the percentage of jobs gained or lost. However, predictions are variable, and according to the 2019 World Development Report, the “disparate effects of technology

render the economic predictions of technology-induced job losses basically useless.”³⁵

IMPLICATIONS FOR THE WORKFORCE

Advanced IT already affects both low-skilled and high-skilled workers. Employees who are involved in routine or lower-skill tasks that are codifiable are most at risk,³⁶ given the declining cost and increasing availability of machines. White-collar jobs may also face some automation, with algorithms becoming more proficient at knowledge-related tasks.³⁷ The most vulnerable are unlikely to receive the kind of training they require to remain relevant in the job market; few of those in jobs at high risk of disruption have received training in the last year.³⁸ The future of work brings about potentially negative social effects, such as unemployment, inequality, and unfairness, driven in part by increased labor market

A focus on upskilling and reskilling workers

SKILLSFUTURE SINGAPORE

Technology is reshaping almost all aspects of our lives. It is connecting more people with global markets and changing patterns of production and consumption around the world. Automation is re-envisioning industries and services. This period of change, often referred to as the Fourth Industrial Revolution, promises significant shifts in the way technology shapes sectors, society, and even biology. Parts of Sub-Saharan Africa may not have fully realized the benefits of the Second and Third Industrial Revolutions. They face an opportunity—albeit a difficult one—to leapfrog this past and complete in a new era of accelerated technological change.

For more information, visit:

<http://www.skillsfuture.sg/>

polarization—the expansion of high and low-skill jobs coupled with the decline of middle-skill jobs. This trend already is occurring in advanced economies, but whether it will take place in low- and middle-income countries remains to be seen. Without policy interventions, some workers could take lower-wage jobs or face temporary spells of unemployment.³⁹

Emerging economies are at high risk of disruption and “need to take rapid action to ensure they can compete in the economy of the future.”⁴⁰ In these countries, many workers are in low-productivity jobs, often in the informal sector. Across Sub-Saharan Africa, unofficial jobs are estimated at three-quarters of the workforce, while in Ghana this is likely even higher, at about 85 percent to 90 percent (Ghana’s economic landscape is explored in more detail in chapter 3). Access to technology is typically lower in the informal sector. Persistent informality, which has remained high over the last 20 years despite improvements in regulation, is an added obstacle to managing rapid technological change. Some researchers describe it as the “greatest challenge for emerging economies”⁴¹ affecting wages and productivity.

A SKILLING IMPERATIVE

This changing landscape for technology means an urgent demand for new skills. This includes shifts in the types of skills required and the emergence of new skill sets, as well as a growing focus on existing skill sets that will increase in importance. Employers anticipate a shift in more than 40 percent of skills required for the workforce before 2022.⁴² They also predict that more than half of employees are likely to require significant lessons in new or improved skills.⁴³ Adults who already are well-established in the workforce also will face this need.⁴⁴

THE CHANGING REQUIREMENTS FOR SKILLS

This research aims to understand the shifting demand for skills from the perspective of education organizations as well as recruiters, with a particular lens on Sub-Saharan Africa and, specifically, Ghana. These regions and perspectives have

been underrepresented in skills studies.

Study researchers undertook a global digital skills survey in October and November 2018. More than 60 percent of the respondents were African, of whom 50 percent were Ghanaian. The survey sought to understand the trends in digital skills in Sub-Saharan Africa, broader emerging markets, and developed markets (full survey questions and details on the survey analysis are in Appendix A).

Respondents identified which skills they thought were most important for the future workforce. The skills perceived as most vital were predominantly socio-behavioral (see figure 4), with digital skills in the top seven. The skills cited as important include critical/analytical thinking, communication, problem solving, leadership, collaboration, computer literacy, application of technology, creativity, decision making and reasoning, and team work skills.

Respondents from different regions agreed on the most important skills types (see figure 5). Regardless of geography, respondents believe that many key skills for the future are

Workforce accelerator to bridge the digital divide

TRILOGY EDUCATION

GLOBAL

Founded in 2015, Trilogy Education is a workforce accelerator that partners with leading universities around the world to bridge the digital skills gap. The organization provides part-time, full time, and online classes in web development, data analytics and visualization, user experience and user interface, and cybersecurity. Curriculum developers evaluate each program to meet employer needs and student demand. More than 2,500 companies such as Apple, Google, and IBM have hired Trilogy graduates.

For more information, visit:

<https://www.trilogyed.com/>

Figure 4: Significance of Skills Required in the Future Workforce

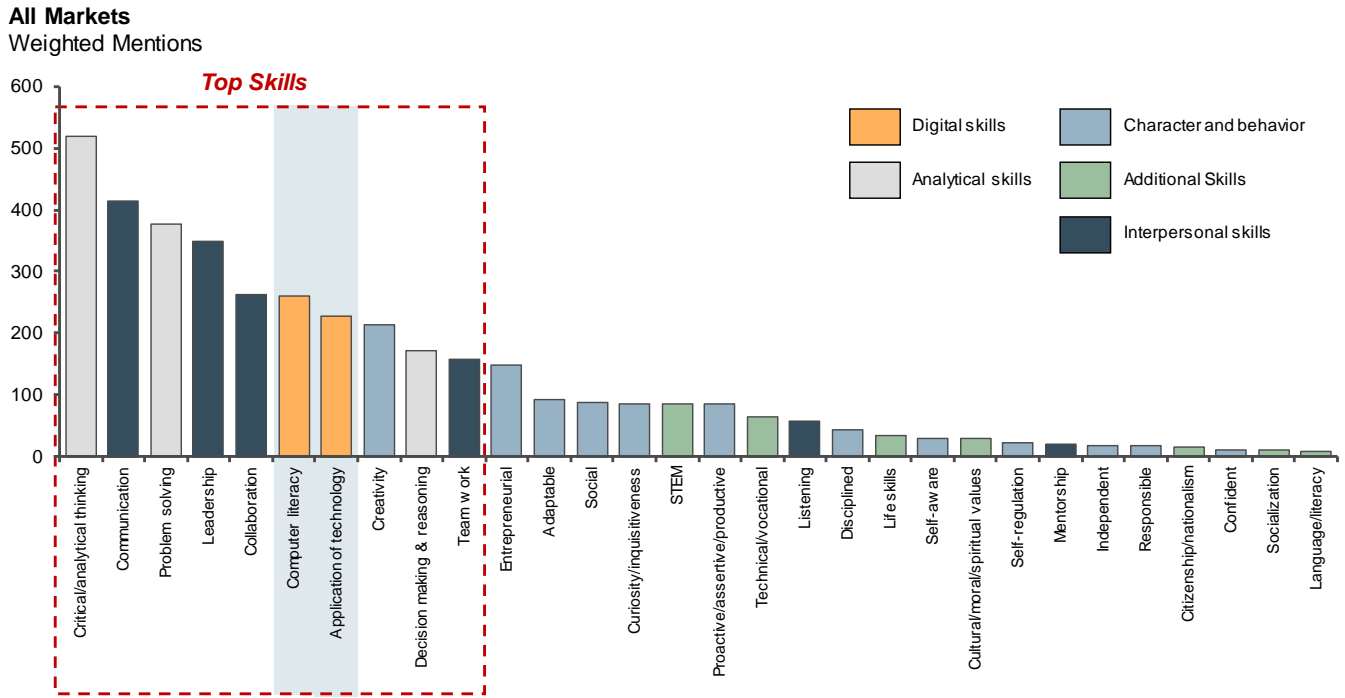
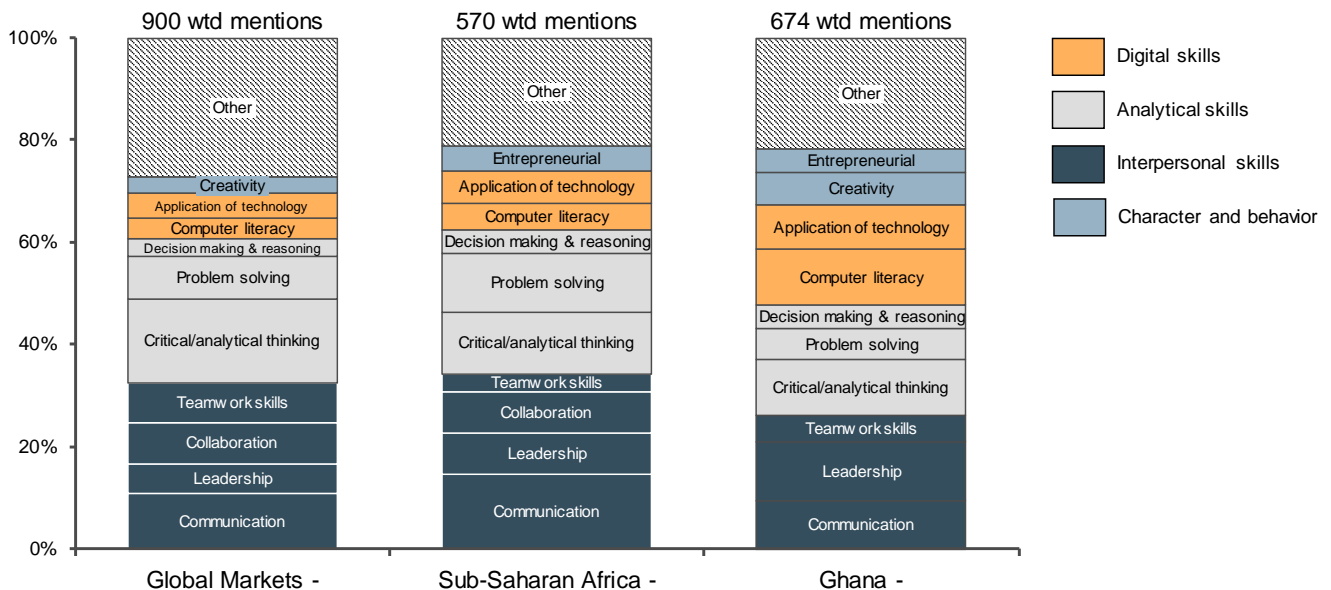


Figure 5: Significance of Skills Required in the Future Workforce, by Market

Global Markets - , Sub Saharan Africa -, Ghana -
Percentage (Weighted Mentions)



related to *how* people work and learn new ways of working, rather than *what* they know.

There is also consensus on the importance of capabilities to use technology, with a higher proportion of Ghanaian respondents citing the importance of digital skills.

These findings on the importance of socio-behavioral and technical skills are reflected in other recent research. A 2017 study across South Africa, Mexico, the Philippines, and Kenya found that education stakeholders unanimously identified twenty-first century skills, such as communication and technology, as more important for learners than other skills, such as academic skills and character traits.⁴⁵ Since 2001, the share of employment in occupations heavy in nonroutine cognitive, interpersonal, and socio-behavioral skills has increased in both emerging and advanced economies⁴⁶ and this demand will likely continue to rise (see figure 6).⁴⁷ Researchers estimate a nearly 25 percent growth in demand through 2030 for social and emotional skills, such as leadership and managing others.⁴⁸ Employers consider a lack of these skills at least as problematic as a lack of technical skills,⁴⁹ and some studies show that the job market already is rewarding professions that put a high premium on social skills.⁵⁰

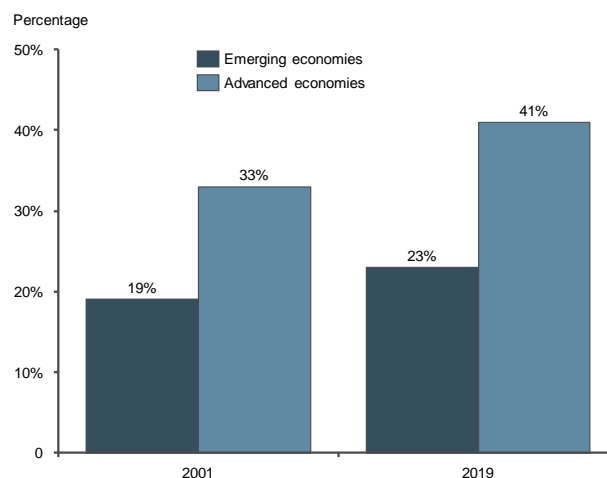
Enabling growth through digital skills GOOGLE DIGITAL SKILLS FOR AFRICA INITIATIVE PAN- AFRICA

Google launched its Digital Skills for Africa initiative in March 2016 to help provide equal opportunities and improve employability and business growth. Since its inception, the program has trained 2 million people across 29 countries in Africa. It aims to increase this number to 10 million people by 2022. The training is provided in-person through partners across Africa, and online in English, French, and Portuguese. For job seekers and small and medium-sized businesses, these trainings are customized to provide targeted solutions. Of the first 1 million people trained, more than 19,500 businesses have increased their staff numbers, more than 85,000 people have started new businesses, and more than 124,000 individuals have found a new job or grown in their careers.

For more information, visit:

<https://learndigital.withgoogle.com/digitalskills>

Figure 6: Estimated Change in Share of Employment in Occupations, 2001-2019



Online learning for job readiness

UPGRAD

INDIA, SOUTHEAST ASIA

This online higher education company offers students industry-relevant programs in collaboration with leading faculty and universities. The company's vision is to build careers of tomorrow. Programs cover subjects such as data science, technology, and management. UpGrad has been able to effectively address the growing demand for tech and digital skills by giving individuals access to programs aligned with business needs. The company has over 250 hiring partners and has witnessed over 450 successful career transitions, with a 47 percent reported salary increase. It also provides businesses and colleges with opportunities to improve the skills of their workforce and students.

For more information, visit:

<https://www.upgrad.com/>

Industry-relevant digital courses

COURSERA

GLOBAL

Coursera is the world's largest online educational platform for higher education with over 35 million learners across the globe. It partners with more than 150 leading universities and educators to provide courses, degrees, and specializations across a vast range of subjects. Many courses offered by the platform are free and students pay a fee to earn a certificate. Over 1,400 companies use Coursera for Business, the platform's upskilling initiative that focuses on training teams and enterprises.

For more information, visit:

<https://www.coursera.org/>

prominence by 2022.⁵⁷ Education institutions already are starting to see this dynamic future as an opportunity. The University of California, San Diego developed an interactive course on "Learning How to Learn," which is offered by Coursera (an IFC investee).

THE SKILLS GAP

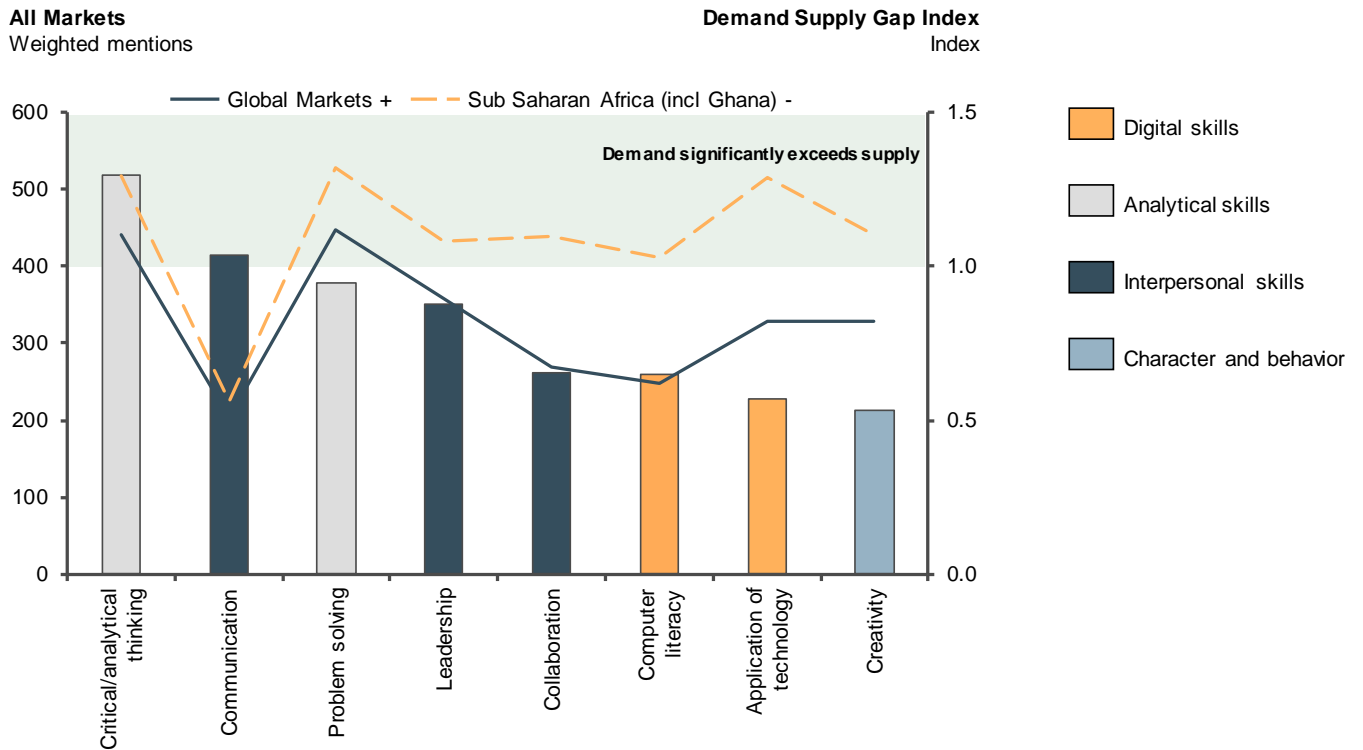
Observers agree on the skill types required for the future workforce and that the current labor force lacks a sufficient supply of these skills. The survey identifies a demand-supply gap for all skills identified as important for the future workforce, which implies a greater demand for these skills than supply of them in the economy. This gap is even more severe in Sub-Saharan Africa and Ghana (see figure 7), particularly in skills of critical and analytical thinking, problem solving, and application of technology.

Significant gaps are identified both for cognitive and socio-behavioral skills and for technical skills. One study found only one-third of workers in Organisation for Economic Co-operation and Development member countries have

Recent studies built off employer interviews also note a sharp increase in demand for technological competencies.⁵¹ The share of jobs requiring few digital skills has fallen while the digital requirements for most jobs has increased.⁵² All technological skills, both advanced and basic, are expected to see a growth in demand, and will exceed more than 50 percent by 2030.⁵³ As the UK Forum for Computing Education puts it, "Almost everyone in the workforce will soon need basic digital skills to do their job, notwithstanding their need for those skills in order to engage more broadly with society and government."⁵⁴ The demand for technical skills is explored in further detail in chapter 3.

Finally, adaptability and "learning how to learn" emerge from the literature as key skills for the future.⁵⁵ The ability to keep learning and to adapt quickly to changes increasingly matters when finding and keeping work,⁵⁶ with skills in active learning and learning strategies growing in

Figure 7: Supply and Demand for Most Important Workforce Skills*



* Methodology for demand-supply index: A positive value on the index indicates that demand exceeds supply and a negative value indicates the opposite. The magnitude of the index reflects the extent of the demand-supply gap. For the gap index, the responses have been weighted as per the rank assigned to them with the following weights: $D \gg S = 2$, $D > S = 1$, $D = S = 0$, $D < S = -1$, $D \ll S = -2$, and then normalized for each geography to account for difference in the number of responses

advanced cognitive skills that enable them to evaluate problems and find solutions.⁵⁸ Nearly 95 percent of executives cite a “moderate” or “severe” digital skills gap.⁵⁹ More than 50 percent of companies believe they have lost competitive advantage owing to a shortage of digital talent.⁶⁰

In 33 of its member countries, OECD found 25 percent of adults have little or no experience with computers and show low levels of proficiency in using technology. More than 50 percent can carry out only the simplest of computer tasks.⁶¹ This challenge is likely to be more extreme in Sub-Saharan Africa, where one in five people use the Internet, compared to almost two in five in Asia-Pacific countries.⁶²

There is a demand-supply gap identified in all key skills for the future workforce.

The question this skills gap raises is where and how these skills can be taught, and taught quickly, to prepare workers. All regions will require increased ability to cope with change and many workers will have to be trained on the job to adapt to new labor market requirements.

Countries that are able to quickly teach workers skills will weather the coming technological change more effectively. This is a particularly challenging issue for developing countries given the footloose nature of firms—that is, their ability to move regions in search of better conditions and talent. The markets that manage to teach additional skills to their populations will likely benefit most. The biggest consideration for companies exploring job locations is the presence of skilled local talent, which is a more important factor for employers than cost.⁶³

Middle-income countries with higher degrees of labor market formalization will offer increased opportunities to learn “on the job,” while low-income countries with large informal sectors will limit the opportunity to learn “on the job” and accumulate human capital through work, potentially widening the gap with middle-income countries.⁶⁴

A SHIFT REQUIRED FOR GLOBAL EDUCATION SYSTEMS

An unprecedented pace and degree of change is required to meet the educational needs of the Fourth Industrial Revolution. Analysts agree education systems are not prepared for the pace or scale of change required to address the current technological shifts. Investments in human capital are essential, but how those investments are made will be as important as the capital deployed. Key shifts required include:

- **Shifts Required to What People Learn:** Technology is reshaping the core curriculum of many academic fields. One study estimates nearly 50 percent of subject knowledge acquired during the first year of a four-year technical degree will be outdated by the time students graduate.⁶⁵ This is reflected in the labor market: a recent

Digital skills for school-age pupils

TUMO CENTER FOR CREATIVE TECHNOLOGIES

ARMENIA

This free, after-school learning center offers teenagers the opportunity to acquire a variety of skills such as animation, web design, film making, writing, and drawing. It enrolls more than 14,000 students. The program consists of self-learning activities, workshops led by TUMO specialists, and project labs designed by technology and design professionals around the world. The TUMO application provides students with a personal learning plan that constantly gets updated with the courses they take. This allows students to track their progress and have a record of their “living diploma.” TUMO’s futuristic learning approach has equipped teenagers with new educational tools to expand their knowledge and skill sets in an interactive and flexible manner.

For more information, visit:

<https://tumo.org/en/>

“There is a gap in skills provision, due to the pace of innovation; students need an adaptive set of skills. A successful education program is the one that ensures their digital readiness.”

– Dionisis Kolokotsas, Google

study found 80 percent of Indian engineering graduates are “unemployable.”⁶⁶ A global technology company executive interviewed for this report said, “We struggle to find employees who are ready to jump into the needs of our industry. I’m talking about people who are digitally literate—to code, be digital marketers, data analysts, creators. Why is that? There is a gap between what skills [education systems] offer versus what economies need.”⁶⁷ Globally, 85 percent of countries include computer skills in their curriculums for upper secondary school. But some regions lag, with Sub-Saharan Africa at only 50 percent, and much lower in earlier years of school.⁶⁸

The acquisition of foundational skills that ought to take place at school age is not occurring in many low- and middle-income countries.⁶⁹ Basic, foundational skills may not be sufficiently provided, let alone technical skills. Children and youth in developing countries tend not to have access to information and communications technology lessons in classrooms and instead often learn digital skills informally outside of the school system.⁷⁰

- **Shifts Required to How People Learn:** Current educational systems often fail to teach broader socio-behavioral skills and digital skills. This can be for a variety of reasons. First, while education systems and stakeholders value twenty-first century skills, determining how to teach and assess skills can be challenging. This is particularly true in environments that still employ rote learning teaching styles, since “a focus on twenty-first century skills also means a need for changes in pedagogical approaches.”⁷¹ Some global initiatives explore how to teach and assess twenty-first century skills but these often are too technology heavy or are not applicable enough to fold twenty-first century skills into pedagogy, curriculum, and assessment.⁷² Curricular changes emphasizing active learning and creative thinking—both part of a twenty-first century skills approach—are not sufficient since teachers must be trained so they can deploy these methods.⁷³

Classrooms, especially in low-income countries, typically do not have access to cutting-edge technology or access to the Internet (although some low-cost computer and

Reshaping advanced digital skills learning

42

FRANCE AND USA

42 is an engineering and computer programming college that offers rigorous academic and technical resources. It has more than 3,000 students across campuses and has received over 150,000 applications since it opened in 2013. 42 has an innovative program structure in that it has no traditional teachers or classrooms, and instead focuses on project-based learning, skills training, peer evaluation, and gamification. There are two parts to the program. Part 1 consists of a four-week introductory programming course, while Part 2 is a three-to-five-year self-paced curriculum that allows students to work on both required and optional projects. Students also learn interpersonal skills, time management, and project management in addition to technical skills.

For more information, visit:

<https://www.42.us.org/>

coding providers like Raspberry Pi and micro:bit are finding ways to lower costs). In some poorer countries, even electricity supply is not guaranteed.

The approach to teaching digital skills in schools often focuses on subjects, so digital skills are taught in, for example, a computer course. One technology executive interviewed for this report said, “There is a need to change how technology is taught in classrooms. Education institutions teach technology as a separate subject while they need to integrate it in the pedagogy across all subjects to improve student experience and comfort with technology.”⁷⁴ Technology integration within wider disciplines remains scarce and there are calls for reform to teacher education programs so that instructional technology and digital skills are woven into each course in a student’s major.⁷⁵ A number of studies cite teachers’

Enhancing teaching of digital skills
THE NATIONAL CENTRE FOR
COMPUTING EDUCATION
UNITED KINGDOM

The United Kingdom Department for Education awarded a nearly \$110 million contract in 2018 to establish the National Centre for Computing Education run by STEM Learning, the British Computing Society and the Raspberry Pi Foundation. The organization was set up as a network of up to 40 school-led computing hubs to provide comprehensive training and professional development resources to computer science teachers. The centers allow teachers to receive both in-person and online training, as well as free resources and support with the goal of enhancing teaching quality across the country.

For more information, visit:

<https://teachcomputing.org/>

Promoting a safe digital environment
ONLINE SAFETY AND DIGITAL
LITERACY
VIETNAM

In June 2018, Facebook partnered with the Management and Sustainable Development Institute, a Vietnamese nongovernmental organization, to launch a nationwide campaign on online safety and digital literacy in Vietnam. The program recruited 135 youth between the ages of 18 and 23 to become Youth Digital Leaders and provide training in skills relating to digital literacy, online safety, public speaking, and leadership. These leaders have targeted 30,000 students across 35 high schools in Vietnam, through training and workshops, supplemented by online resources.

For more information, visit:

<https://wethinkdigital.fb.com/programs/management-and-sustainable-development-institute/>

discomfort in teaching technology to students who may be more advanced or experienced in its use than they are.⁷⁶

- **Shifts Required to When People Learn:** New models for skilling are required that will enable lifelong skills acquisition and retraining. Workers in jobs need to upgrade their existing skills, but most current educational models train people at the start of their lives and offer few options to upgrade skills during a career. This occurs despite significant ramifications. The economic and social cost of adult illiteracy to developing countries, for example, is estimated at more than \$5 billion a year.⁷⁷ Even in middle-income countries like India, only 24 percent of citizens from 18 to 37 who dropped out of school during primary education could read.⁷⁸

Changes need to address education and skill levels for

people of all ages.⁷⁹ Foundational skills are critical, and early childhood education is increasingly seen as an essential part of developing human capital. It is important to learn foundational skills, including digital skills, from an early age. Many education providers are still focusing on traditional age groups, such as kindergarten through twelfth grade and post-secondary school, without considering how they might play a role in teaching new skills to working adults.⁸⁰ Distance education, for example, through online and hybrid models that leverage technology, can be an effective channel for addressing the needs of an adult population that requires flexibility.

Such challenges may be exacerbated in emerging economies, where these shifts are occurring amid pervasive challenges to accessing a quality education. About 260 million children, of whom 50 percent are girls, remain out of school. More than 600 million children are

in school but not learning well. Primary and secondary age students are not meeting minimum proficiency levels in math and reading. Nearly half of this cohort is girls.⁸¹

THE CONTEXT FOR SKILLS IN SUB-SAHARAN AFRICA

Against this backdrop, Sub-Saharan Africa faces unique realities in preparing its people for jobs of the future. The shifts described previously in what, how, and when people learn are relevant for Sub-Saharan Africa, but need to be understood within the context of this region.

With nearly 97 million children out of school at primary and secondary levels,⁸² access to education is a well-established issue for the region. That said, there have been great strides in enrolling more students in school in the past two decades. These efforts have yielded tremendous results in terms of enrollment.⁸³

But these advances have not translated into enhanced human capital. This is because school attendance is not the same as learning. In Sub-Saharan Africa, despite improvements, learning outcomes remain among the poorest in the world.

A legacy of poor learning is reflected in the fact that the region only captures 55 percent of its human capital potential. Without addressing the learning gaps present in the current education system, Sub-Saharan Africa's youth will be unable to reap the benefits of education, whether or not they are in classrooms. What follows explores some of the major issues countries in the region must tackle to boost learning and enable skills development to support growth and boost competitiveness.

Employment-oriented skills training

DIGIFY AFRICA

PAN-AFRICA

This program provides digital skills training to African youth and entrepreneurs looking to enter the marketing industry or grow their businesses through a variety of online and in-person courses. The program aims to reduce the digital divide in Africa and tackle unemployment. It boasts a strong alumni network of more than 75,000 individuals as well as more than 40 agency partners. Digify Africa frequently works with its alumni to produce digital campaigns, content, and services. It has seen over 500 new professional careers since its inception in 2014.

For more information, visit:

<https://www.digifyafrica.com/>

Poor Development of Foundational Skills

Skills acquired early in life cement the foundation for learning that occurs into adulthood; skills beget skills. People who do not have a strong grasp of foundational skills, including literacy, digital fluency, and numeracy, struggle to attain new or more advanced skills later in life.

In Sub-Saharan Africa, primary school learning outcomes are the lowest in the world. Fewer than 7 percent of late primary school students in the region are proficient in reading. Across Kenya, Tanzania, and Uganda, students are unable to read sentences both in English and local languages. This lag in learning at the primary stage can cascade through a child's years of schooling and later affect preparedness for the workforce.⁸⁴

Like counterparts across other parts of Sub-Saharan Africa, many children in Ghana's schools are not learning the basics. A 2015 study of primary students in 700 schools found that most public-school students were finishing second grade

THE GENDER CONTEXT FOR DEVELOPING NEW SKILLS IN SUB-SAHARAN AFRICA

Girls in Sub-Saharan Africa are at a disadvantage in their foundational skills acquisition. There are 52 million out-of-school girls in Sub-Saharan Africa, nearly 10 million more than the region's number of out-of-school boys.⁸⁷ A 2018 UNESCO report on out-of-school children found that "girls of every school-age group are more likely to be excluded from education than boys across the region."⁸⁸

Gender inequality in the region extends beyond education. Internet penetration is also a greater challenge for women; 50 percent fewer women have Internet connectivity than men in some regions of Sub-Saharan Africa.⁸⁹

In Ghana's education system, the most at-risk segment of the population is impoverished girls. Just 26 percent of the poorest girls in northern Ghana complete primary school compared to 90 percent of boys in Accra's richest quintile. Oxfam noted that 48 percent of the richest urban boys in Ghana leave junior secondary school having learned the basics in mathematics, compared with only 7 percent of the poorest rural girls.⁹⁰

This difference is particularly relevant considering women in Ghana are more likely to be poor and own fewer assets. They are half as likely as men to own land.⁹¹ With nearly two times more men working in the formal sector, women are concentrated in "vulnerable employment in the informal sector"⁹² and are particularly at risk given ongoing economic changes.⁹³

Addressing gender inequality in Sub-Saharan Africa and Ghana is pivotal to ensuring girls are not left behind in the digital revolution.

without basic literacy skills. Mathematics assessments drew similar findings.⁸⁵ Ghana's urban adult population performs much worse in functional literacy skills than counterparts in developed countries.⁸⁶

The most harmful learning deficits can occur even earlier in life and early skills gaps set children on lower developmental trajectories that are more difficult and costly to rectify over time.⁹⁴ Preschool attendance is associated with higher achievement in primary school, in addition to fewer dropouts and a reduced need for remedial education.⁹⁵ Even so, in Sub-Saharan Africa, pre-primary education is allocated an average 2 percent of the education budget.⁹⁶ The region's pre-primary school enrollment rates are low by global standards. Ghana stands out in the region, having steadily increased its pre-primary net enrollment ratio from 63 percent in 2008 to 90 percent in 2014.⁹⁷ This in part reflects the government's commitment to meeting global

development goals. However, studies of Ghana's kindergarten sector have found that the curriculum is "rarely implemented, and that quality is low across the country."⁹⁸ Strengthening foundational skills from the earliest years of education will be critical to enabling continuous skills development.

Availability and Quality of Education System Resources

Education system resources—including teacher training, ongoing support and professional development, the resources teachers can access, and the materials students use to learn—are collectively referred to as "structured pedagogy."⁹⁹ Educational success rests on the ability to supply classrooms with high quality teachers and learning resources. What follows explores some of the key challenges to structured pedagogical interventions in Sub-Saharan Africa.

- **Supply of trained teachers:** Teachers have an outsized influence on education outcomes.¹⁰⁰ However, Sub-Saharan Africa struggles to source teachers who meet even minimum teaching standards, and qualified candidates are in short supply.¹⁰¹ Sub-Saharan Africa is the only region globally where student-teacher ratios in primary schools have worsened since 1970.¹⁰² Across 14 Sub-Saharan African countries, the average sixth grade teacher performs no better on reading tests than the highest-performing students in that grade.¹⁰³

In order to be effective, teachers must have structured opportunities for professional development and growth through pre-service and in-service training.¹⁰⁴ A study of in-service training in eight countries in Sub-Saharan Africa found that teacher training “is often variable and anecdotal, resulting in a growing concern about the usefulness of professional development practices in meeting the training needs of teachers.”¹⁰⁵ Teachers do not receive adequate preparation, training, or advice from experienced education administrators on how to improve teaching.¹⁰⁶ The region must also contend with rampant teacher absenteeism.¹⁰⁷ Achieving universal primary and secondary education in the region will require nearly 5 million new teachers.¹⁰⁸ Meeting this need while maintaining high standards for teacher qualifications will be a significant hurdle for Sub-Saharan Africa. Teachers in much of the region also rely too heavily on outdated methods of teaching. This style of instruction is typically “authoritarian, teacher-dominated, and lecture-driven.” In light of the new skills required by labor markets, teacher training in modern pedagogical methods is critical for the region.¹⁰⁹

The Ghanaian government has instituted national teacher training policies, though these have yet to be fully implemented due to a lack of awareness of the policies, insufficient funding, and minimal infrastructural support facilities.¹¹⁰ The country also must contend with high rates of teacher absenteeism, though the government has taken measures to curb it.¹¹¹ Ghana also faces a shortfall of 140,000 teachers.¹¹² Without more trained teachers in schools, there is little chance the country will deliver a digital skills agenda.

- **Provision of quality learning resources:** Many students in Sub-Saharan Africa lack access to basic learning materials. The current pupil-to-textbook ratio is about 2.4:1 with a target of 1:1.¹¹³ Digital skills improvement relies on students’ access to both these basic and additional technology-based learning materials. Adequate digital resources to do so are not available in most Sub-Saharan African classrooms. Computers are not equitably accessible and are often concentrated in the few schools that meet the basic infrastructural needs to support them. The learner to computer ratio is 277:1 in Gambia, 90:1 in South Africa, 55:1 in Botswana, and 40:1 in Rwanda.¹¹⁴ Even classrooms that do have computers may not take advantage of them because of inadequate school infrastructure and a lack of teacher training in information and communication technologies.¹¹⁵

Africa also has the lowest levels of Internet access in the world; roughly 80 percent of its population is offline¹¹⁶. Most Internet users do not have access to high-speed

“Although ICT is built into the curriculum, most public schools aren’t equipped to teach it well. Kids in Ghana don’t have access to computers and don’t have access to software described in the syllabus, so teachers are teaching this stuff by drawing on blackboards and so on.”

– Patrick Awuah, Founder and President, Ashesi University

Internet and connect through their mobile devices.¹¹⁷ Internet connectivity in primary schools varies dramatically by country in Sub-Saharan Africa.¹¹⁸

Both broader twenty-first century skills development and technical digital skills development is hindered by lack of access to appropriate digital resources.¹¹⁹ Resource access is a key issue in Ghana. Ghanaian respondents to the digital skills survey also cited lack of access to suitable information and communication technology resources as one of the biggest challenges in digital talent recruitment, and free-form answers from respondents about their key challenges in hiring digitally-skilled talent frequently mentioned lack of access to digital resources. Respondents commented on “little access to computers” and “lack of access to infrastructure” with a “lack of resources to provide adequate training facilities.”

A shortage of well-trained teachers and limited availability of digital resources compromises Sub-Saharan Africa’s ability to prepare its population for the workforce needs of the Fourth Industrial Revolution.

Mismatch of Skills Taught and Skills in Demand

Employers across Sub-Saharan Africa say the lack of access to workers with appropriate skills is “a constraint to their growth and productivity.”¹²⁰ More than 40 percent of all firms in Tanzania and 30 percent of all firms in Kenya cite inadequately skilled workforces as a major obstacle. Despite the growing demand for knowledge in science, technology, engineering and math, college graduates with STEM degrees represent 2 percent of Africa’s university age population.¹²¹ This reflects an inherent mismatch between skills acquired through education and skills that are in demand. This mismatch may be exacerbated in coming years given the rapidly evolving skills requirement. Researchers expect the core skills required across occupations in South Africa from 2017 to 2020 will change entirely.¹²²

Technical and vocational education also is not being fully leveraged in Sub-Saharan Africa, and there is an undersupply of higher education seats. Formal technical and vocational enrollment comprises just 6 percent of total secondary and

post-secondary enrollment in the region.¹²³ Another way of tethering education to employment is apprenticeships or internships that, as the World Bank Group’s World Development Report on the *Changing Nature of Work* said, “link training to day-to-day experience and provide motivation through the promise of future economic returns.”¹²⁴ While current apprenticeship reforms indicate this is a priority for governments in the region, apprenticeships have yet to reach their potential. Current reforms center on expanding access to opportunities by incentivizing apprenticeship programs in the private sector and strengthening partnerships with employers.¹²⁵ Industry groups interviewed for this report cited internships and other real-world learning opportunities as critical to African students’ work-readiness.

Respondents to the global digital skills survey in Ghana cited education as the second biggest driver of the demand-supply gap in digital skills. Lack of access to practical educational experiences such as internships were cited as a main obstacle. “Candidates usually lack hands-on experience due to lack of internship opportunities,” one said. Another complained the “talent [was] not able to make the move from theoretical to practical application” with “overdependence on academic qualifications.”

Ghana’s government recognizes the importance of developing employment-focused technical and vocational institutions that will help its population find jobs in demand. President Nana Akufo-Addo in 2018 stated the government’s intention of building 20 more such institutions in Ghana, in addition to the existing 35 schools.¹²⁶ Expansion in Ghana of post-secondary education, potentially through the participation of private providers, is important to ensure there are adequate institutions offering digital skills courses. One barrier to entering the private sector market is the stipulation private colleges affiliate with and pay a mentor public university until they are deemed capable of operating on their own. Modifying these regulations would enable greater participation.¹²⁷ The government is taking steps to expedite the process of granting private universities independence via Presidential Charters and has done so for four universities so far.¹²⁸

CONCLUSION: A “NO REGRETS” APPROACH

Education system leaders will need to address three key barriers in Sub-Saharan Africa and specifically in Ghana as they look to develop digital skills: acquisition of foundational skills, low availability and quality of education system resources, and low relevance of what is taught to the workforce.

The World Bank Group's *Human Capital Project* considers human capital investment, including education, essential to the health and wealth of nations. Therefore, in the face of the challenges and opportunities faced because of a changing future of work, investment in human capital development is a sensible approach. This is what the World Bank Group refers to as a “no regrets” policy: “the most significant investments that people, firms, and governments can make in the changing nature of work are in enhancing human capital.”¹²⁹

Education remains a strong investment: private returns to education—additional income that can be expected as a result of additional years of schooling—remain high despite an expanding supply of skilled labor.¹³⁰ During previous industrial revolutions it has taken decades to build new educational and training systems aligned to the needs of shifting markets. Even now, “education systems... tend to resist change.”¹³¹ But given the pace and scale of disruption brought about by technology, much more rapid change is required.¹³²

Developing the skills required for the future work force will require concerted effort not just from governments but from firms as well. In the chapter that follows, the study focuses attention on one of these areas: the need for digital skills, capturing what these skills are, their current provision, implications for the labor market, and how the need for these skills is expected to evolve.



“Emerging economies are in the middle of a technological shift that is bringing change to the nature of work. Whatever the future holds, investment in human capital is a no regrets policy that prepares people for the challenges ahead”

– *The Changing Nature of Work*,
World Bank 2019 World
Development Report

2. Digital Skills in Sub-Saharan Africa and Ghana

- Digital skills are essential to the future workforce in Africa, with basic skills in most demand and some intermediate and advanced skills also a priority
- There is a demand-supply gap across all levels of digital skills
- Sub-Saharan Africa's demand for digital skills is expected to increase over the next decade, but Africa's economies will falter without more focus on learning digital skills
- Companies are looking abroad to find talent and industry observers believe that an undersupply in digital skills would hamper expected economic growth
- While governments in Sub-Saharan Africa and Ghana have taken steps to integrate information and communication technology in education, the policy response has not been sufficient

There is an urgent need to develop digital skills to fuel jobs of the future. The following section defines digital skills, examines the current state of digital skills supply and demand in Sub-Saharan Africa and Ghana, and explores how this is expected to evolve by drawing on the findings of the global digital skills survey. It also looks at the policy landscape for digital skills on the continent.

THE WIDER CONTEXT OF SKILLS

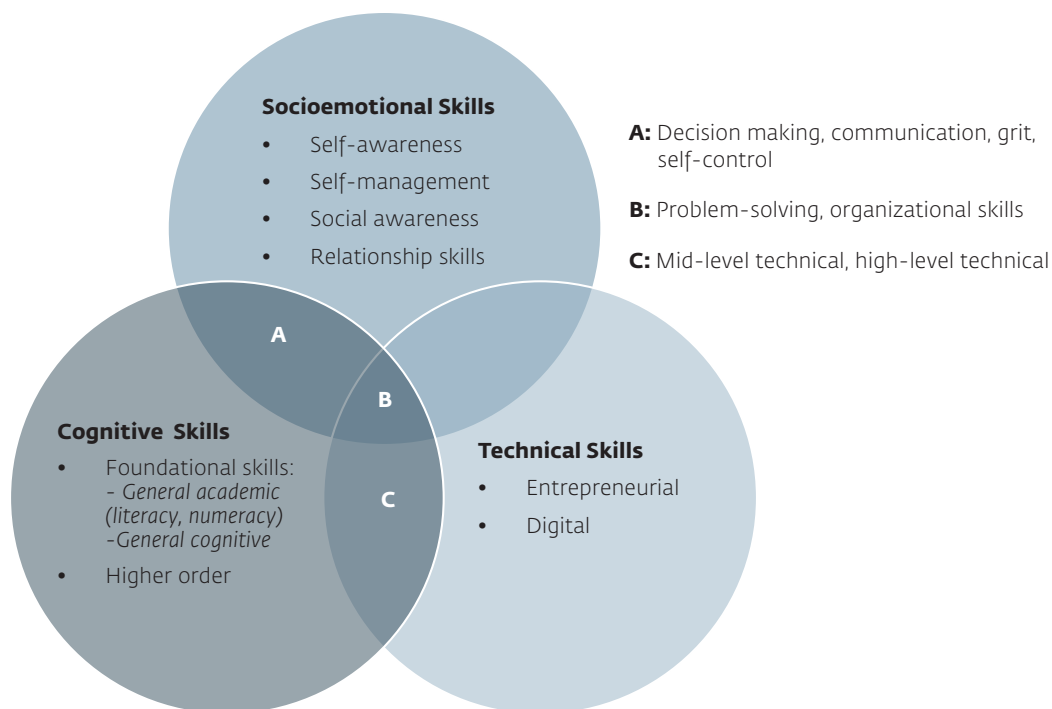
Digital skills are central to questions about preparing children and young people for an evolving workforce. How does one build a skill set that can be applied across disciplines and is founded on practices in thinking and behavior rather than solely on knowledge and technical abilities? The concept of twenty-first century skills has gained traction over the past few years, with definitions and frameworks changing during this period. These definitions typically comprise a range of skills, abilities, behaviors, and

attitudes that are required for success in the twenty-first century. Jobs in this era require "specific skills—a combination of technological know-how, problem-solving, and critical thinking as well as soft skills such as perseverance, collaboration, and empathy."¹³³

Digital skills feature prominently in twenty-first century skills frameworks and are core to notions of future-ready education. The Partnership for 21st Century Skills framework identifies "digital literacy" as one of three core skills areas.¹³⁴ The 7C's framework, which is tied to the previous effort, highlights computing and information and communication technology literacy, among seven key skills. In *Learning to Realize Education's Promise*, the 2018 World Development Report, the authors share a three-pronged skills framework of technical, cognitive, and socioeconomic skills (see figure 8), with "digital skills" categorized within technical skills.¹³⁵

Despite their centrality to frameworks for twenty-first century learning, digital skills are a moving target for

Figure 8: Skills Framework, Learning to Realize Education’s Promise, 2018 World Development Report*



*World Bank Group, 2018, *Learning to Realize Education’s Promise*, 2018 World Development Report.

definition. The development of ICT involves a set of skills that are continuously evolving and built upon as technology shapes our working lives. *Digital Skills for Life and Work*, a report by the UNESCO Working Group on Education, identifies trends that shape current requirements for digital skills and competencies (see figure 9). These are expected to shift over time as the digital landscape evolves.

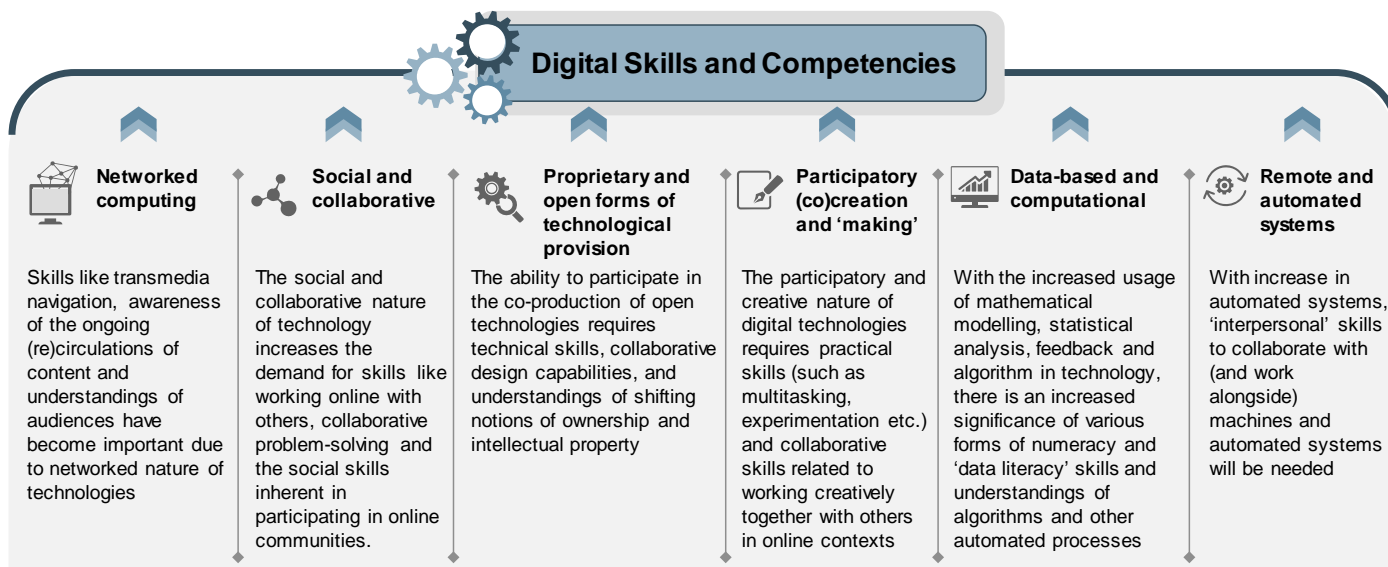
DEFINITIONS OF DIGITAL SKILLS

In this study, digital skills refer to skills related to the use of technology. The literature is largely aligned on how levels of technical digital fluency can be categorized. In the World Bank report, *Digital Jobs for Youth: Young Women in the Digital Economy*, digital skills are separated into three levels: basic,

intermediate, and advanced.¹³⁶ In a similar vein, the UNESCO report uses a digital skills framework that divides them into basic, generic, and higher levels.¹³⁷ This three-tiered categorization ranges from knowing how to use technology to communicate to more complex usage such as big data analysis. For purpose of this report, the study will categorize and define digital skills as basic, intermediate, and advanced, using the following definitions:

- **Basic digital skills** are defined by UNESCO as “entry-level functional skills required to make rudimentary use of digital devices and applications.”¹³⁸ With basic digital skills, users are typically able to operate devices such as computers and smartphones, access and store information from online resources, and set up online accounts and profiles. Individuals with basic skills can

Figure 9: Trends Shaping Requirements for Digital Skills and Competencies, UNESCO Working Group on Education, *Digital Skills for Life and Work* Report



Source: Adapted from UNESCO *Digital skills for life and work* 2017

communicate digitally, make online transactions, organize finances online, and access online government services. These are considered foundational digital skills changes as technology evolves.¹³⁹ Examples of digital skills in specific work tasks could include farmers' use of video calls to consult with veterinarians, industrial workers' interest in online tutorials to learn new skills, or small business operators' ability to access online banking and government services (see figure 10).

- **Intermediate digital skills** enable individuals to use digital tools for more significant task-oriented purposes. UNESCO defines intermediate skills as "the skills that enable an individual to make substantive and beneficial use of online applications and services," while the OECD defines them as a set of generic information and communication technology skills used to complete tasks.¹⁴⁰ They are often required for professional growth and are applicable to a range of jobs. Intermediate skills include using professional software for presentations and analytics, digital marketing and social media analytics, and web and graphic design. They can be used across business

Figure 10: Uses of BASIC Digital Skills, by Sector




SECTOR	REPRESENTATIVE TASK TYPES	EXAMPLES
 AGRICULTURE	Web research Mobile communication	Farmers using government websites to check crop prices Farmers using Whatsapp to exchange photos and other informative videos Farmer using video calls to consult with a veterinarian
 INDUSTRY	Online communication E-learning	Workers sharing photos of their work with managers to update them on progress Workers watching tutorials/videos on how to operate new machinery
 SERVICES	Web research Online communication Online government services E-banking	Executives exchanging emails Small businesses accessing online banking or government tax portals Drivers using mobile apps to connect with passengers and reading online maps

Figure 11: Uses of INTERMEDIATE Digital Skills, by Sector







SECTOR	REPRESENTATIVE TASK TYPES	EXAMPLES
 AGRICULTURE	Use of simple spreadsheets for accounting	Managers in agricultural businesses using financial software to track income and expenses
 INDUSTRY	Use of professional software Interaction with robotics equipment	Engineers using modelling software like AutoCAD White collar workers using software for project management, making presentations, and spreadsheets
 SERVICES	Use of professional software	Tourism operators using digital marketing to reach a larger base of clients Small business owners designing websites to attract business Professionals using software to develop analysis and make presentation

Figure 12: Uses of ADVANCED Digital Skills, by Sector

SECTOR	REPRESENTATIVE TASK TYPES	EXAMPLES
 AGRICULTURE	Use of big data analytics Development of specialized automated equipment	Data analysts in agricultural companies leveraging big data to analyze yield, chemicals and biomass index for future predictions Engineers developing robots to pick fruit
 INDUSTRY	Computer programming Network management Automation Digital manufacturing	Specialists using advanced robotic equipment in manufacturing plants Engineers running computer simulations for understanding physical processes
 SERVICES	Computer programming Cloud computing Machine learning and AI	Animators using specialized software to make films Programmers developing social media sites Developers using AI to power language learning apps

functions, such as accounting or project management (see figure 11).

- Advanced digital skills** allow people to use technology in empowering and transformative ways. UNESCO defines these as “the group of skills that form the basis of specialist ICT occupations and professions.”¹⁴¹ These occupations include, but are not limited to, computer programmers, artificial intelligence experts, and data scientists. To acquire advanced skills, individuals typically must undergo specialized training, in addition to gaining practical experience in specific ICT fields. Advanced skills may include programming, big data analytics, cloud computing, cyber security, web development, and search engine optimization. Examples of work applications would include automation of industrial processes, operation of computer-powered machinery in manufacturing, data analytics in financial sector jobs, and a range of others (see figure 12).

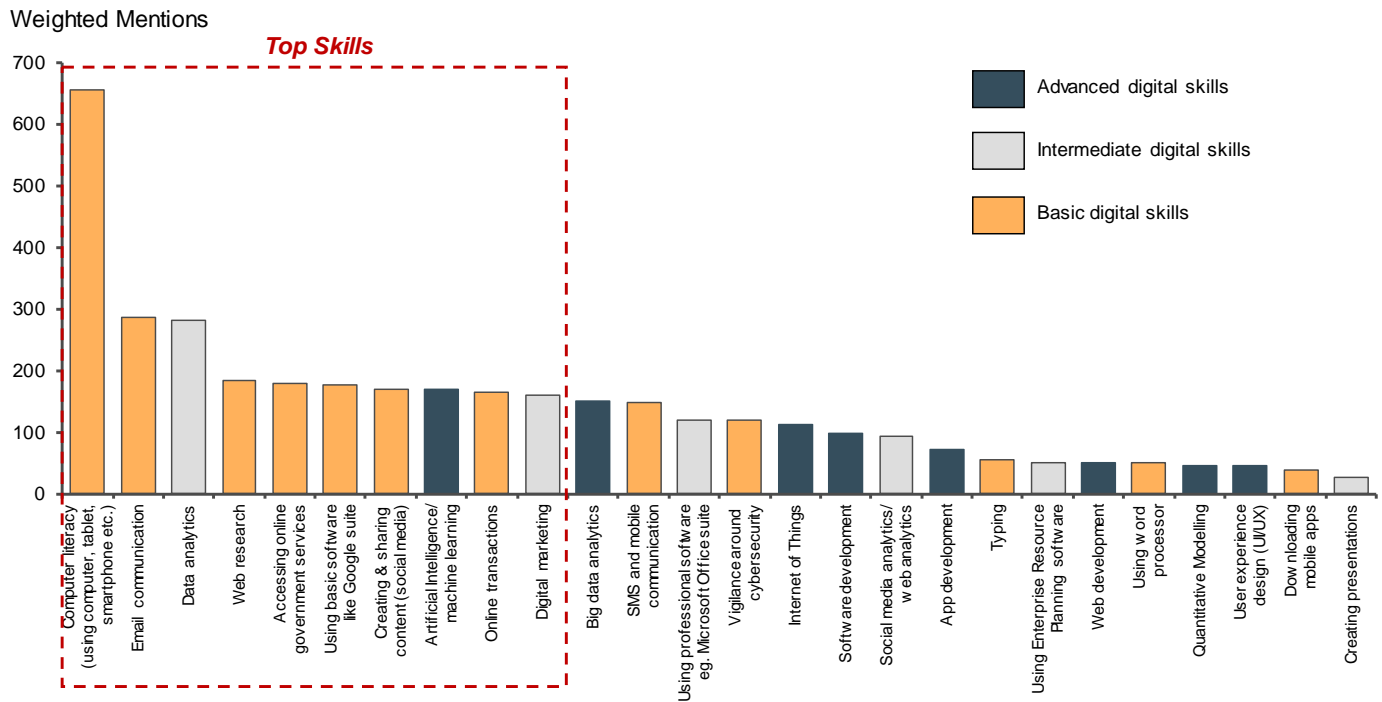
It is important to note that digital skills are not mutually exclusive. Individuals are likely to have a range of these skills, such as having basic proficiency in one skills area while working at an intermediate or advanced level in another. This framework forms the basis for the analysis of digital skills needs and demands throughout this report.

PERSPECTIVES ON DIGITAL SKILLS IN SUB-SAHARAN AFRICA AND GHANA

As Chapter 1 reveals, digital skills are identified among the top seven skills for the future of the workforce. They are considered undersupplied globally, with the gap in demand and supply more significant in Sub-Saharan Africa.

This study also sought to understand the demand for specific types of digital skills, the balance of supply and demand in those skills, the anticipated change in demand over time, and the current market implications of any imbalance in demand and supply of skills. The global digital skills survey included respondents from chief executives of global and African education institutions, investors in education, policymakers, and Ghanaian human resource professionals,

Figure 13: Significance of Digital Skills Needed in the Workforce, All Markets



bringing both an education supply and demand perspective to the question of digital skills. More than 60 percent of respondents were African, of whom 50 percent were Ghanaian.

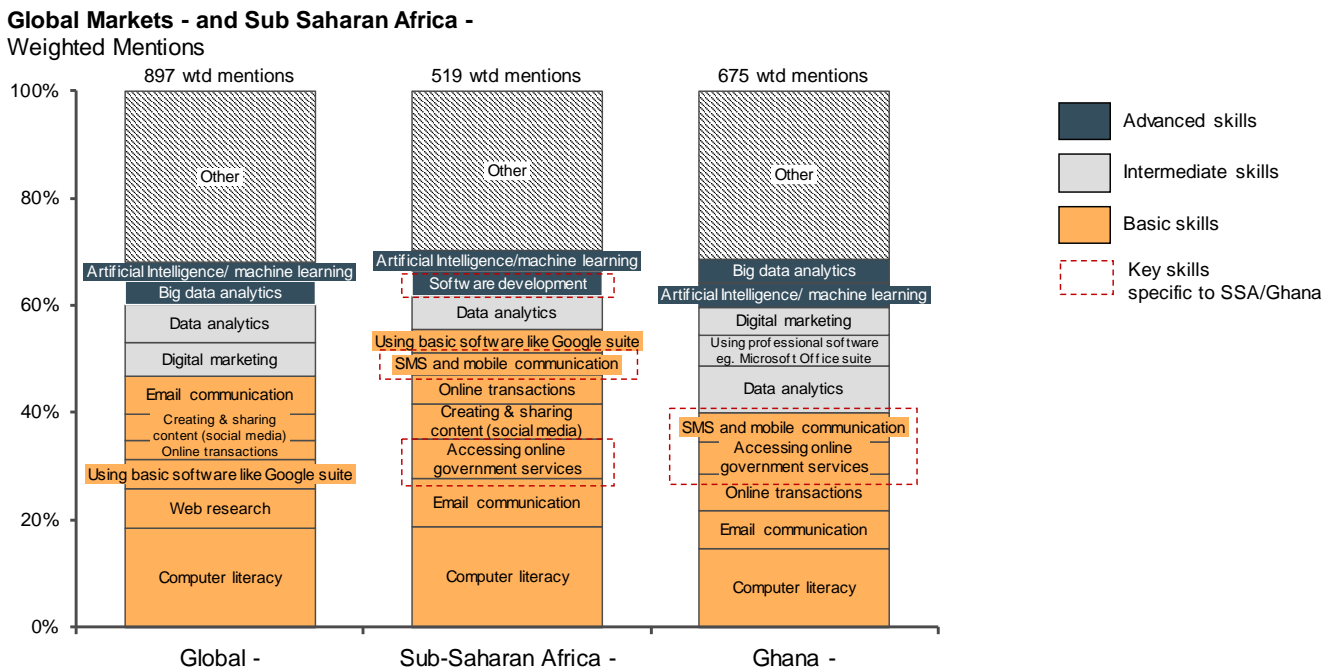
The survey found basic digital skills such as email communication, web research, and online transactions are viewed as essential to the future workforce, but some intermediate and advanced skills such as data analytics, artificial intelligence/machine learning, and digital marketing were perceived among the top required skills (see figure 13) across countries. Basic digital skills dominate these findings precisely because they are foundational, but it is noteworthy that some intermediate and advanced skills are now considered essential to future economies.

The top two digital skills cited across all markets are computer literacy (ability to use a computer or smartphone) and email communication, both basic skills. Survey respondents weighed data analytics, an intermediate skill, as the third most important digital skill for future job markets.

“The digital skills requirement is gradually shifting from basic skills, like computer literacy, to intermediate skills in industries. Banking and similar industries are moving from clerical to digital in terms of outlook. As the level of technology increases, there is new innovation giving rise to niche software for different kinds of jobs.”

– HR Manager at a leading bank in Ghana

Figure 14: Significance of Digital Skills Needed in the Workforce for Global Markets, Sub-Saharan Africa, and Ghana



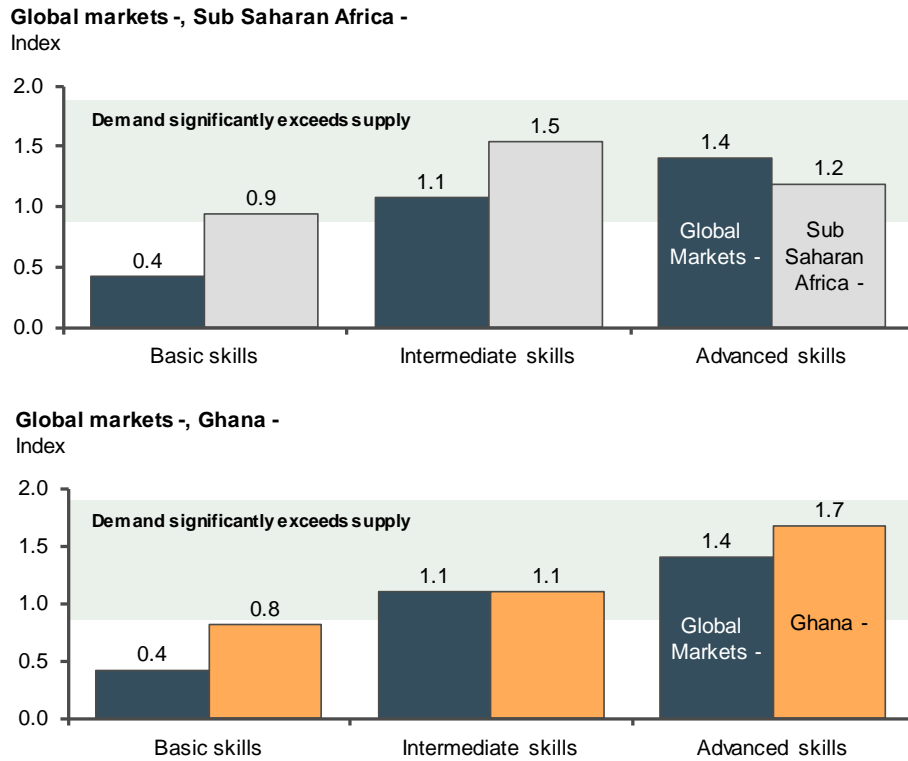
Survey respondents agreed on the top digital skills required in the future workforce regardless of geography. These include basic skills such as computer literacy, web research, using basic software, online transactions, social media, and email communication. However, Ghanaian respondents expect more emphasis on intermediate skills including data analytics, use of professional software, and digital marketing than wider Sub-Saharan Africa respondents (see figure 14). These attitudes reflect the majority of survey respondents in Ghana, who are formal sector recruitment professionals. They also identified in interviews a greater need for intermediate skills. Basic skills are essential, but competitiveness will also rest on the ability of Ghana’s burgeoning services sector to leverage intermediate digital skills, such as using professional software and managing data.

Basic skills are more likely to help mobilize the growing middle class in Sub-Saharan Africa. There are two skill areas common across Ghana and Sub-Saharan Africa but not observed among non-African participants: texting and mobile communication and accessing online government

services. Ghana was one of Africa’s largest mobile markets in 2017, with nearly 35 million subscribers and a 119 percent penetration rate (implying more than one phone per person).¹⁴² Industries are expected to increasingly leverage mobile phones as a core platform for communication in business.

A growing number of social and government services also are available online. In the past two decades, governments in the region increasingly emphasized ICT as a way to deliver services. Studies have found that these e-government websites “are increasingly becoming the fundamental platform for interaction between governments and citizens.”¹⁴³ E-government websites, according to one assessment, are an “essential strategic tool that governments can use to facilitate interactions with the general public, especially the provision of public services.”¹⁴⁴ While these websites vary in their complexity and development, and access and infrastructure remain prevalent issues in the region, such technologies are clearly becoming one of the primary ways citizens can interact with the government and benefit from its services.¹⁴⁵

Figure 15: Demand Supply Gap in Digital Skills by Skill Level*



* Methodology for demand-supply index: A positive value on the index indicates that demand exceeds supply and a negative value indicates the opposite. The magnitude of the index reflects the extent of the demand-supply gap. For the gap index, the responses have been weighted as per the rank assigned to them with the following weights: $D \gg S = 2$, $D > S = 1$, $D = S = 0$, $D < S = -1$, $D \ll S = -2$, and then normalized for each geography to account for difference in the number of responses

DEMAND-SUPPLY GAP IN DIGITAL SKILLS

The study’s researchers sought to understand whether there is an imbalance of supply and demand in digital skills, whether this is consistent across regions, and how this is expected to change over time. They found a demand-supply gap anticipated across all levels of digital skills for all markets, suggesting greater demand for these skills than supply of them in the economy. Both education specialists and employers noted economies require more of all skill levels than are currently available.

Respondents believe that, in Sub-Saharan Africa, the largest supply-demand gap is in intermediate digital skills (see figure 15). There is a relatively lower demand for advanced skills in Sub-Saharan Africa, which is likely due to a lack of

“Students who have advanced digital skills training prefer going to universities abroad for further students, hence we don’t find a lot of local talent with advanced skills here.”

– HR Executive, marine logistics company in Ghana

jobs requiring advanced skills in the region. However, Ghana is expected to have a larger supply gap for advanced digital skills than for intermediate skills. The supply of advanced talent has likely been unable to keep up with demand, according to interviews with market participants, in part because many students with advanced skills relocate to developed countries to pursue higher education and better employment opportunities.

LABOR MARKET FOR DIGITAL SKILLS

The labor market for digital skills in Sub-Saharan Africa, particularly Ghana, is already highly developed. Survey respondents identified what percentage of jobs in their organizations would require at least the level of skills indicated—basic, intermediate, or advanced. As figure 16 indicates, roughly 60 percent of all new digital hires, regardless of geography, need basic skills. Some 30 percent require intermediate skills in Sub-Saharan Africa, while 35 percent in Ghana and 37 percent in global markets require them, according to survey respondents. While this figure drops to just 16 percent needing advanced skills across Sub-Saharan Africa, Ghana requires 22 percent of new hires to have advanced skills, and in global markets this figure rises to 30 percent. Sub-Saharan Africa is over-reliant on jobs that require only basic skills and has a lower proportion of jobs requiring advanced skills. As economies in the region

Hands-on training in Africa

GEBEYA

ETHIOPIA, KENYA, UNITED STATES AND UNITED KINGDOM

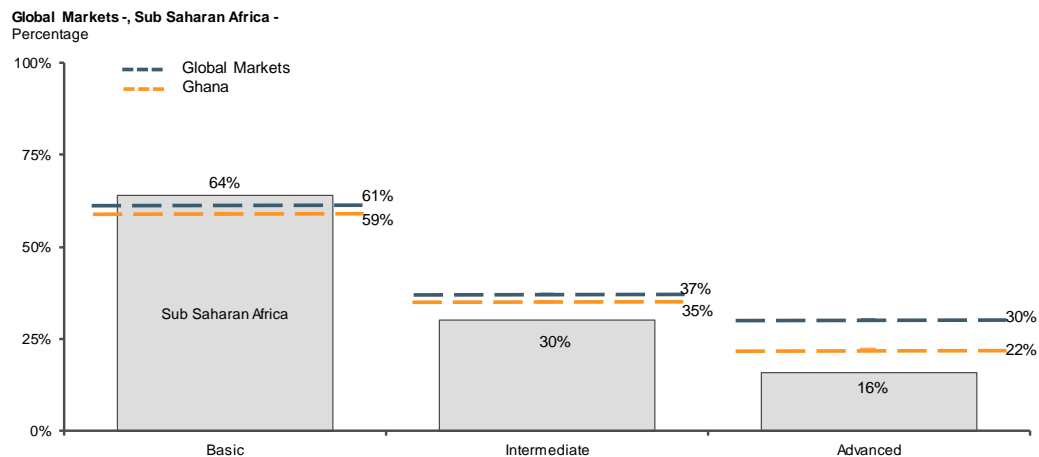
Gebeya is an organization that provides six months of hands-on software development training to information technology professionals across Africa, equipping them with the skills needed to become employed by African and global businesses. Its core curriculum comprises a professional development module, individual or team capstone project, core software development module, and technical specialization courses.

In July 2018, Gebeya acquired Coders4Africa, a network of software and mobile app development platform. This has allowed Gebeya to grow its talent pool and expand its reach.

For more information, visit:

<http://www.gebeya.com/>

Figure 16: Proportion of Digital Recruits Requiring at Least the Stated Level of Digital Skills¹⁹²



become digitally advanced, the share of employees needing more advanced digital skills will likely increase. The digital needs of Ghana's economy have progressed at a faster pace than those in the rest of the region, with a greater proportion of new hires requiring intermediate and advanced skills.

The survey also sought to understand how demand for digital skills is likely to increase. In line with global markets, Sub-Saharan Africa and Ghana are expected to see a strong growth in demand for digital skills (see figure 17). Respondents in 2018 said they thought 64 percent of jobs require digital skills globally but expected that 84 percent would require them in 2028. In Sub-Saharan Africa, the current demand for these jobs is 47 percent but expected by survey respondents grow to 75 percent within the next decade, just 10 percentage points lower than the anticipated global levels. The faster growth rate of digital skills in Sub-Saharan Africa and Ghana suggests the rate of digital transformation will likely be higher in these regions. The supply of digitally-skilled labor in Sub-Saharan Africa and Ghana will need to increase to meet these anticipated labor

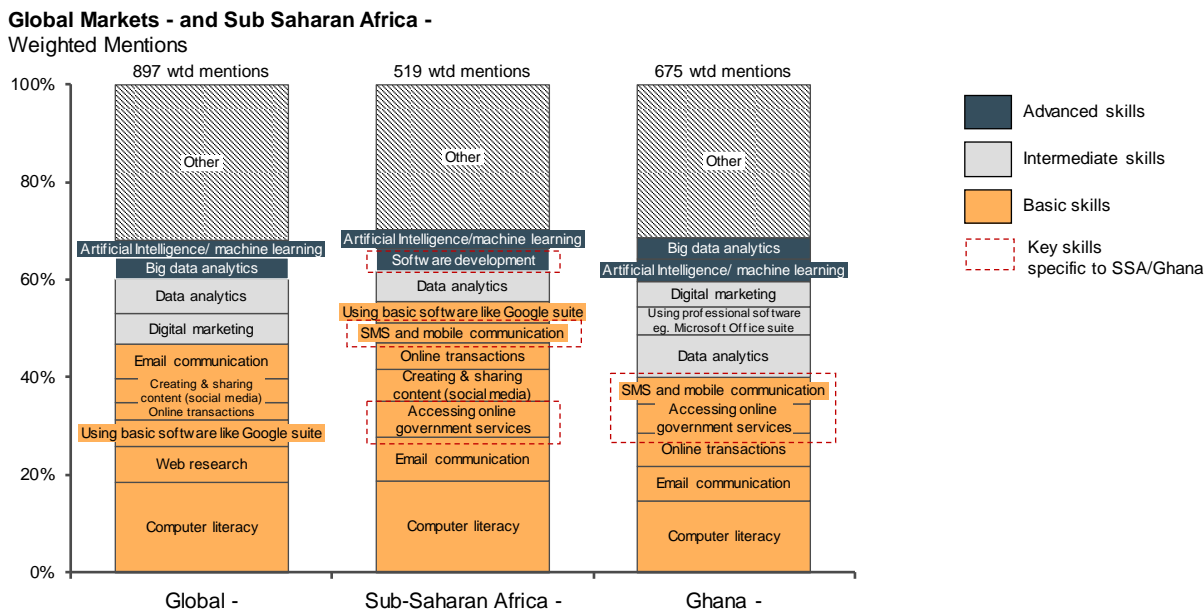
market needs. Given that human capital drives the economy,¹⁴⁶ the region will witness a stultifying effect on growth if these digital skills gaps are not addressed.

LABOR MARKET CONSEQUENCES OF DEMAND-SUPPLY GAP

The study aimed to identify the key challenges employers in Ghana face in finding digitally-skilled talent, as well as the consequences for employers of a demand-supply imbalance in digital skills. Employers cited a range of obstacles when recruiting for digital talent. They named an undersupply of digital talent, a lack of relevant skills even in recruits who have had digital training, and minimal ICT equipment in the country as reasons behind the undersupply of talent and the struggle to find qualified workers. Recruiting for digital skills is further complicated by human resource managers' inadequate ability to assess digital skills capabilities during the hiring process.

There are at least three likely scenarios for a labor market that lacks digital talent.

Figure 17: Percentage of Jobs Requiring Some Digital Skills, 2015-2028



First, employers with the wherewithal to hire globally can look to other regions to fill essential gaps, though this will be costly. The demand-supply gap for digital skills in Ghana is driving employers to recruit internationally. Survey findings show that nearly 20 percent of surveyed Ghanaian companies recruit only internationally. Of these, nearly 70 percent do so because they cannot find skilled local talent (see figure 18).

Second, employers can train existing employees or new recruits through digital skills training programs that invest in their workforce. The availability of on-the-job training was not explored in this survey, but insights from market participants suggest that many employers are leveraging either in-house or externally-secured training to fill gaps in employees' digital skills.

Finally, the demand-supply gap in digital skills could be harming productivity and compromising Sub-Saharan African competitiveness. Employers, particularly in the informal sector, typically cannot recruit overseas staff or implement training programs. They may fill urgent gaps by

seeking training for themselves or staff but often find workarounds or fail to keep pace with technology, compromising their viability and productivity.

Industry participants confirm concerns that without adequate digital skills, countries in Sub-Saharan Africa will fail to remain competitive. A lack of digital skills could constrain the growth of Africa's economies and reduce productivity just as more industries need to adopt digital technologies to drive productivity. As one observer noted, not having adequate digital skills for Sub-Saharan Africa, "would be a major setback. We would be significantly cut off from the digital economy. Sixty-five percent to 70 percent of the population is under 35 and if they aren't digitally equipped, we, as a continent, would not be able to engage globally."⁴⁷

These observations hold true for Ghana. This study's interview findings show that about 80 percent of Ghanaian industry members consulted believe an undersupply in digital skills is likely to hamper economic growth in Ghana (see figure 19). Industry experts from agriculture to retail and

Figure 18: Recruitment of Employees with Digital Skills, Ghana

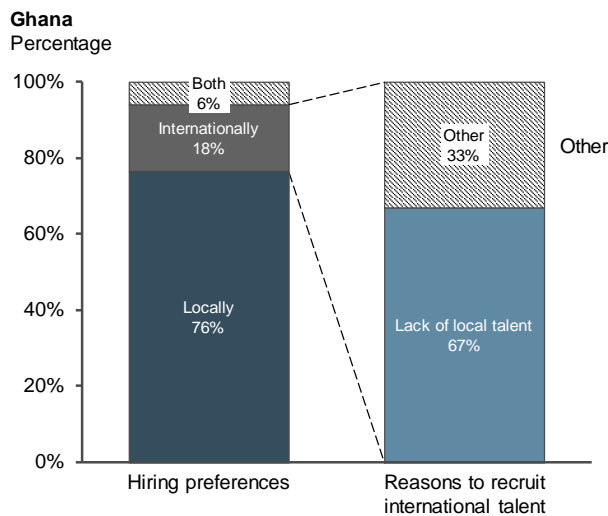
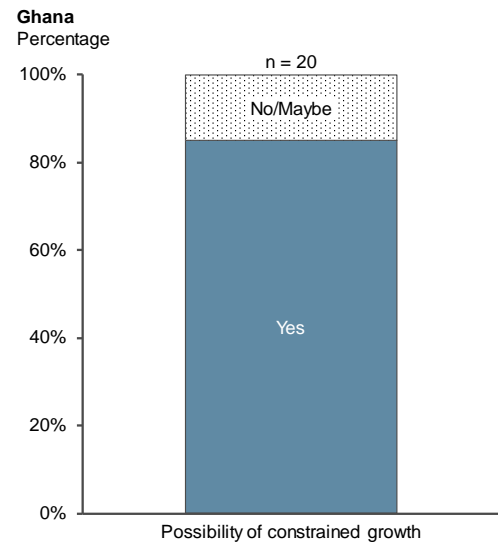


Figure 19: Responses: Will Undersupply of Digital Skill Constrain Expected Growth in the Economy?



Training to enhance digital literacy

DIGITAL AMBASSADOR PROGRAM

RWANDA

This program is a partnership between Rwanda's Ministry of Youth and Information Communication Technology, Digital Opportunity Trust (a youth-led social innovation initiative), and the World Economic Forum's Internet for All Northern Corridor initiative (a program aimed at closing the digital divide). The program supports 5,000 young digital ambassadors in providing digital literacy training to Rwandan citizens. The training focuses on basic digital skills to help rural Rwandans who have minimal experience using the Internet. This will enable the country to expand its economic opportunities by increasing equality in job opportunities and Internet skills.

“Has there been a recognition of the importance of the digital economy? Yes. Has there been a recognition of the importance of building skills? Sometimes, yes, but not all the time.”

– Titi Akinsanmi, Policy and Government Relations Lead, West and Francophone Africa, Google

manufacturing agree that digital skills are critical for the country's future.^{148, 149}

THE POLICY CONTEXT FOR DIGITAL SKILLS IN SUB-SAHARAN AFRICA AND GHANA

Given the urgency for digital skills development, what are governments in Sub-Saharan Africa doing to address it? While many countries recognize the importance of harnessing information and communication technology to drive competitiveness—whether in attracting technology start-ups or bringing the power of digital technologies to established businesses—fewer have translated this into an education and human capital development agenda.

Some Sub-Saharan African countries have taken initiatives to develop ICT policies that set out education objectives:

- South Africa has achieved significant progress in the integration of ICT in education. The country has several public entities concerned with ICT as well as a national commission to advise on ICT development and support it in education. Digital skills are introduced at the secondary level in South Africa.
- Uganda first developed a national ICT policy framework in 2003 and the government is currently working on an ICT policy specific to the education sector.
- Senegal had adopted an ICT policy in 2009, which has not had much impact due to the lack of a more comprehensive range of related policies.
- Rwanda's IT sector is a major driver of growth for the economy, and government-backed initiatives like the Digital Ambassador Program have supported a massive effort to train 5 million people in Internet use.¹⁵⁰

Ghana has been “nimble” in harnessing digital opportunities, according to market participants.¹⁵¹ Its ICT policies include robust data protection policies that have helped it attract global companies like Google. The Silicon Valley company in 2018 announced the set-up of its first southern hemisphere

artificial intelligence research center in the country. Ghana in 2015 published its ICT in education policy framework, which highlighted teacher training in digital skills and the introduction of ICT as a subject from primary school through high school. Taught content, it said, would “range from basic appreciation and hands-on experience from the primary schools to computer literacy and applications use at the senior high school level.” The policy also advocated the addition of computer science as an elective in high school. Since a full nationwide rollout of these interventions would not be practical, the policy identified qualifying schools to start. It also accounted for the level of urgency to train teachers and the proximity of educational institutions to the job market. It said higher-education institutions and teacher universities would be prioritized over lower levels of schooling.¹⁵²

While these education policies are seen as moving in the right direction, experts say the Ghanaian government “does not have the infrastructure to execute them well.”¹⁵³ There are real concerns—articulated by market participants and reflected in the findings of the survey—that not enough is being done to invest in human capital for the digital economy.

Another World Bank study found “existing education policies in most African countries need thorough review and updating to ensure that the policy for ICT in education supports and is supported by complementary policies for education as a whole.”¹⁵⁴ This suggests that ICT education must be integrated into national education systems rather than viewed as a separate policy initiative. Some governments in the region are taking measures to do this, although this is occurring slowly due to a lack of formalized policy, financing, infrastructure, and trained teachers.¹⁵⁵

CONCLUSION: AN ECONOMIC IMPERATIVE

Sub-Saharan Africa’s economic prosperity, and Ghana’s, largely depends on whether the region is able to successfully bridge the supply-demand gap in digital skills. If this gap is not addressed, economic growth rates may not be sustained. People in Sub-Saharan Africa and Ghana need digital skills training programs to help bridge the demand-supply gap and ensure employers can hire locally, find suitable training for employees, and helps workers keep pace with new technology in their industries.

Future employers will require a range of digital skills levels. There is a strong, growing demand for technical and digital skills as work becomes more digitized and as more jobs require interactions with machines. The world’s economies will need digital skills at all levels. The digital skills survey shows that a strong demand for digital skills is expected

“If we are serious about ICT, every school needs to be connected to the Internet, with computer labs accessible to students, teachers and administrators. We need to teach kids early on about programming — how to use and create technology. We need to teach coding from high school level. All kids need to have some basic understanding of how this works.”

– Patrick Awuah, Founder and President, Ashesi University

across markets, and that Sub-Saharan Africa—and Ghana in particular—likely will see growing demand for digital skills over the next decade.

The study also highlights the need for basic digital skills, which enable users to access information online and engage with technology. These are fundamental to functioning in society, and governments should consider them part of the

foundational skills taught in school. It is important these skills fall under the purview of national governments that can make them part of a national curriculum. While some economies are taking steps to seize the digital opportunity and increase digital skills, not enough is being done to account for and correct a demand-supply imbalance.



Employees of Africa's Talking working at their desks in Nairobi, Kenya. Photo © Dominic Chavez/IFC

3. Understanding Demand for Digital Skills

- There is strong demand for digital skills in Sub-Saharan Africa and Ghana. This is driven both by latent economic growth as well as the digitization and automation of agriculture, manufacturing, and services.
- In Sub-Saharan Africa, over 230 million jobs will require digital skills by 2030, resulting in almost 650 million training opportunities
- In Ghana, over 9 million jobs will require digital skills by 2030, translating to about 20 million training opportunities
- The largest opportunities are in business-to-business and business-to-government training for basic and intermediate skills, though there are significant opportunities in business-to-consumer skilling focused on intermediate and advanced skills
- The revenue opportunity size across Sub-Saharan Africa in digital skilling is \$130 billion through 2030
- The opportunity in Ghana alone represents nearly \$4 billion in revenue potential through 2030

Chapter 1 establishes the need for new skills to prepare workers for the jobs of tomorrow, while chapter 2 focuses on the digital skills requirements for Sub-Saharan Africa, with a spotlight on Ghana. In this chapter, the report turns to the size of the demand for digital skills in Sub-Saharan Africa and Ghana. This is based on an extensive modeling exercise by L.E.K. that provided a broad sizing for digital skills demand and market opportunity in Sub-Saharan Africa and a granular, detailed estimate of digital skills demand and market opportunity in Ghana.

The analysis estimated the market size for digital skills in Sub-Saharan Africa at more than 230 million jobs requiring digital skills through 2030. This will translate to nearly 650 million training opportunities through 2030, given that employees will need retraining during this period.

Business-to-business and business-to-government opportunities for Sub-Saharan Africa will reach about 625 million people who need digital skills and nearly \$120 billion in revenue through 2030, while business-to-consumer opportunities will see about 25 million people requiring digital skills during that time and \$11 billion in revenue.

More than 9 million jobs likely will require digital skills in Ghana through 2030. This will translate to nearly 20 million training opportunities.

Business-to-business and business-to-government opportunities in Ghana will encompass nearly 20 million people who need digital skills through 2030 and nearly \$3.5 billion in revenue, while business-to-consumer opportunities will mean about 1 million people require digital skills through 2030 and \$320 million in revenue.

Researchers have not mapped supply-side for this study in either Sub-Saharan Africa or in Ghana, although fee points and course duration data have been collected.

CONTEXT FOR MARKET SIZING

Ghana's government aims to make the country a hub for private sector investment in Sub-Saharan Africa, in sectors as varied as ICT, financial services, and education. As Ghana's Communications Minister, Ms. Ursula Owusu-Ekufu, noted, "We're looking forward to even greater applications of ICTs in all sectors of our economy...we want Ghana to be the IT hub for the West African sub-region."¹⁵⁶ Digital skills are critical for spurring the digital economy in Ghana. A number of sources are confident there is "substantial scope"¹⁵⁷ for the ICT sector to grow amid continued demand for digital skills in the labor force.

To assess the potential for public and private sector stakeholders, it is important to get a sense of the potential market size in Ghana for digital skills and to gain insight on the labor demand through 2030. Researchers examined Ghana's economic forecast and interviewed 20 employers in the country across industries and institutions to understand

how demand for digital skills is expected to evolve. The methodology for market sizing is explored in Appendix A.

DRIVERS OF DEMAND FOR DIGITAL SKILLS IN GHANA

Ghana's future demand for digital skills hinges on five key factors. They are explored below (see figure 20) and fully detailed in Appendix B.

This study found the overall requirement for digital skills, assuming a workforce of more than 20 million Ghanaians, is expected to reach 50 percent by 2030. This will represent a 75 percent to 80 percent usage rate in the formal sector, aligned to the perceptions of survey respondents, and 45 percent to 50 percent in the informal sector.

The drivers of demand for digital skills vary across sectors. Digital technology allows agricultural workers to get better information, including from the government, which can improve agricultural productivity. Farmers need digital skills to access insurance, savings programs, and credit to buy farm tools. Demand for digital skills is likely to increase in industrial sectors because, as an observer noted, "better

Figure 20: Key Drivers of Demand for Digital Skills in Ghana



technology is expected to mitigate some of the dangers of physical jobs.¹⁵⁸ Online videos can support training and skills-building for workers in industrial jobs, while text messaging enables them to send photographs of their work to supervisors.¹⁵⁹ The services industry has the highest anticipated levels of digital skills requirements. Changes in customer demand and behavior drive market competition, from expectations that hotels will have websites to demand for easier shopping and faster parcel delivery.

The market for digital skills in Ghana is estimated at more than 9 million jobs requiring digital skills through 2030. This will translate to nearly 20 million training opportunities by 2030 (given requirements for both training new market entrants and training existing market participants).

MARKET SIZE FOR DIGITAL SKILLS IN GHANA THROUGH 2030

Business-to-Business and Business-to-Government Versus Business-to-Consumer Potential

Educational products and services that include digital skills training are typically provided in one of three ways: business-to-business, business-to-government, or business-to-consumer. Business-to-business models involve the sale of products or services to institutions, such as schools, corporate entities, or education providers. Business models are dependent on buyers' purchasing capability and willingness to pay. These offerings might include corporate training or digital skills curricula. Business-to-government models involve the sale of products or services to local or national governments. This is used in instances when the private sector could provide greater efficiency, speed, or quality than developing capabilities or leveraging public resources. These offerings might include public-private partnerships to provide digital skills or teacher training services, textbooks and classroom materials, or learning management systems. By contrast, education business-to-consumer models are intended for consumers, with products typically purchased by students and parents. Business models occasionally mix, with some revenues from business-to-business or business-to-government offerings and some

Best practices for technology-oriented learning

ASHESI UNIVERSITY

GHANA

Ashesi University is a private university in Ghana offering full-time, four-year undergraduate programs in computer science, management information systems, engineering, and business administration. It has over 1,000 students and over 1,200 alumni. The university has embedded technology-focused learning into every aspect of its curriculum. All students must learn coding basics and design thinking, irrespective of their majors. Ashesi also teaches technology skills to local students in the community to provide more opportunities for digital skills. Almost all of Ashesi graduates receive job opportunities, start their own companies, or begin graduate school within six months of graduation.

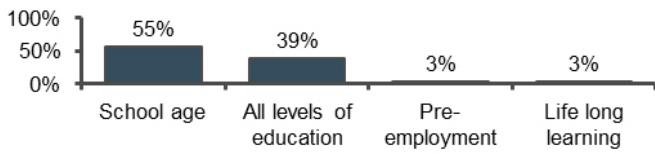
For more information, visit:

<https://www.ashesi.edu.gh/>

from business-to-consumer.

Basic digital skills training programs are unlikely to be viable for business-to-consumer models since the potential for self-pay is limited. As explored in chapter 2, basic digital skills are defined as the ability to access digital technologies, such as web research, sending emails, and use of professional online platforms. These skills are in high demand, but they also are unlikely to be skills that are paid for directly by students and parents. In fact, 90 percent of respondents to the global digital skills survey consider "school age" or "all levels of education" the best stage to learn basic skills. This suggests they expect adults to already have these skills (see figure 21) and may explain why market participants do not think self-pay models for basic skills training have much potential. Ghana-based human resource managers said in interviews that most basic digital skills can also be learned

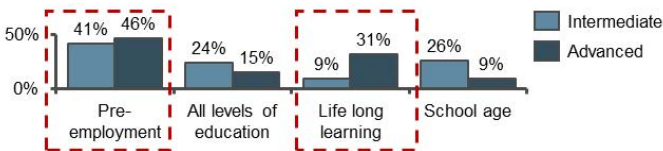
Figure 21: Digital Skill Training by Education stage, Basic Skills



on the job. “A lot of our recruits from university are not proficient with basic digital skills such as using Microsoft Outlook, MS Excel, MS Word.,” a Ghanaian manufacturing company employee said. “They pick these skills on the job. I doubt that candidates would be willing to pay for basic digital skills training programs.”¹⁶⁰

By contrast, intermediate and advanced digital skills courses provide an opportunity for directly charging the consumer. Examples of intermediate digital skills include digital marketing, social media management, and graphic design, while advanced digital skills form the basis of specialist ICT

Figure 22: Digital Skill Training by Education stage, Intermediate and Advanced Skills



occupations. Some 50 percent of survey respondents believe that pre-employment training and post-secondary education are the best avenues for acquiring intermediate and advanced digital skills.

This report’s case studies include several successful examples of paid offerings for intermediate and advanced digital skills, typically because of their clear ties to future jobs. “One of our key value propositions is that the content is relevant to industry needs and is developed in partnership with industry experts, involving them in the evaluation of projects,” a case study participant said. “As a result, the programs are considered very effective in building the advanced skill set

required for enhancing students’ career and they are willing to pay a fee of \$200 per month for these programs.”¹⁶¹

Given these factors, the business-to-consumer market for digital skills is expected to stay limited to intermediate and advanced skills while the business-to-government and business-to-business market opportunity could thrive in basic, intermediate, and advanced skills.

About 15 percent of households will be able to afford intermediate and advanced digital skills in 2030, according to an affordability estimate using the average price for these skills. Ghana will have roughly 1 million potential paying customers for digital skills through 2030 (see figure 23).

Ghana Market Sizing

The market for digital skills through consumer-pay, business-to-consumer education, given inflation and Ghana’s training fees, will reach about \$380 million through 2030.

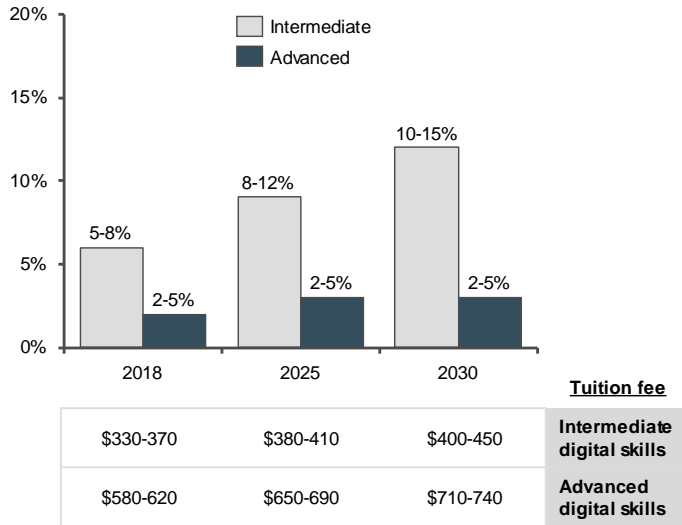
A much larger opportunity exists in business-to-business and business-to-government skilling in Ghana. This will comprise 17.5 million people requiring digital skills and about \$3 billion through 2030.¹⁶² The total market in Ghana for digital skills through 2030 will therefore rise to nearly \$4 billion (see figure 24).

“Across developing countries, people often don’t see tangible benefits in digital skilling for basic skills and therefore don’t show willingness to pay and learn.”

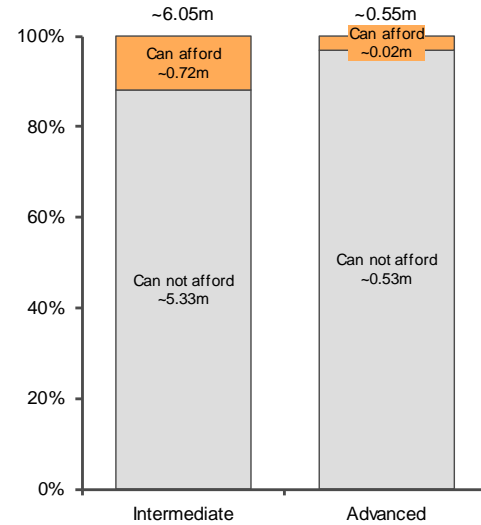
– Senior leader, technology industry

Figure 23: Estimated Total Addressable Market for Business-to-Consumer Digital Skills in Ghana

Affordability levels for digital skills training programs, by level of digital skill (2018, 2025, 2030)



Digital skills requirement in Ghana, by level of affordability, Intermediate and advanced skills (2030)



Note: The fees are assumed to grow in line with inflation statistics reported by Oxford Economics; Assumed ~5% of household income is spent on upskilling (~50% of household education budget); tuition fee assumed to grow at growth rate of household disposable income
Source: L.E.K. Research and Analysis

Figure 24: Estimated Total Addressable Market for Digital Skills in Ghana, 2018-2030

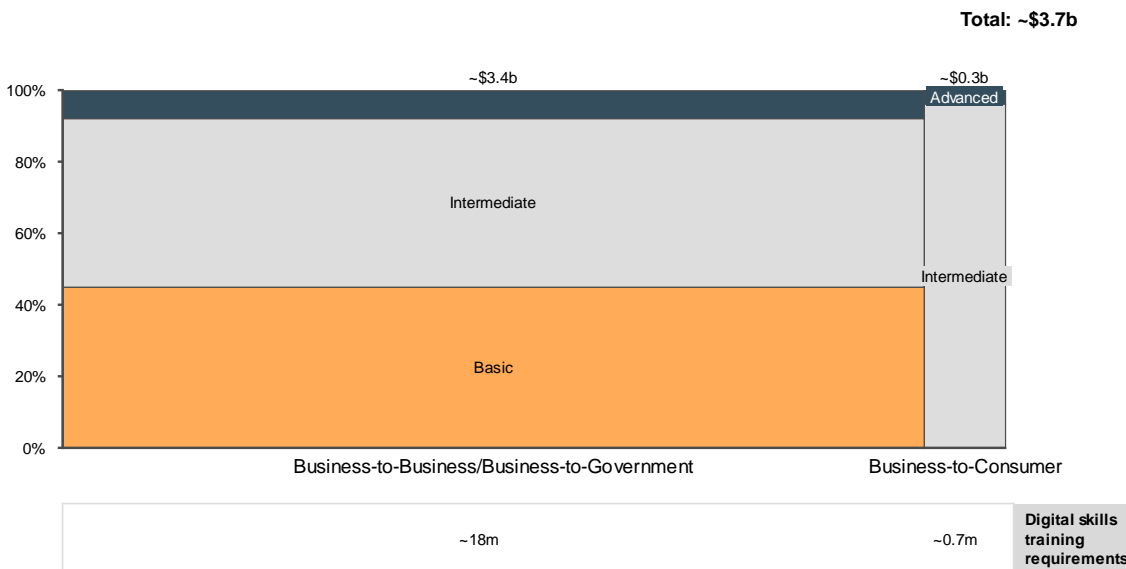


Figure 25: Digital skill Requirement in Sub-Saharan Africa, by Level of Skill, 2018, 2025, 2030

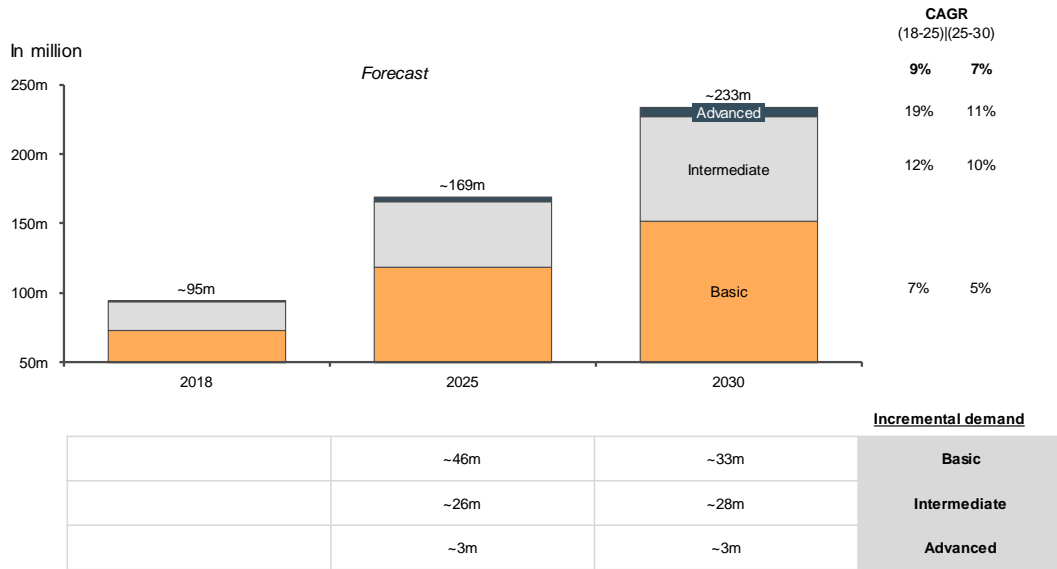
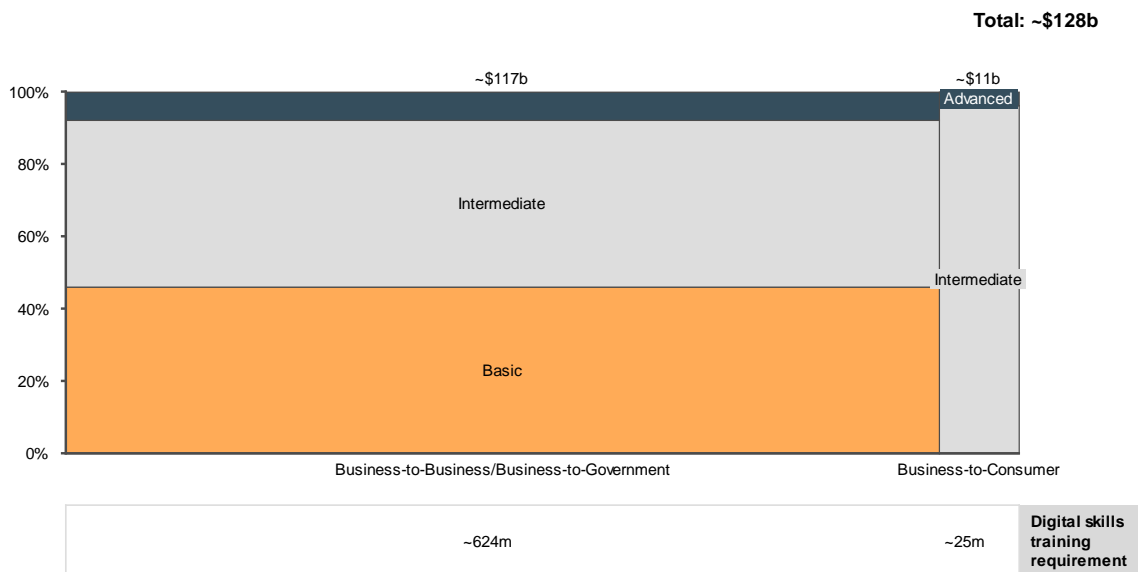


Figure 26: Estimated Total Addressable Market for Digital Skilling in Sub-Saharan Africa, 2018-2030



SUB-SAHARAN AFRICA MARKET FOR DIGITAL SKILLS

The study analyzed the potential market for digital skills in Sub-Saharan Africa. About 230 million jobs in the region will require digital skills by 2030 (see figure 25), with this translating to training opportunities of about 650 million people.

The business-to-business and business-to-government opportunity size for Sub-Saharan Africa will reach around 625 million people who need digital skills and nearly \$120 billion in revenue through 2030, while the business-to-consumer opportunity size will mean around 25 million people require digital skills through 2030 with the potential for \$11 billion in revenue. This will deliver a total market size of nearly \$130 billion (see figure 26).

CONCLUSION

The market for digital skills across Sub-Saharan Africa and Ghana over the coming decade is significant. While transformation will come more quickly to the formal economy, the informal economy is also rapidly influenced by technology and citizens will feel the impact across agriculture, industry, and services. In order for Sub-Saharan Africa's economies to continue to grow, they will need to harness talent and provide digital skills, or risk losing competitiveness and failing to achieve economic potential.

There is clear opportunity for participants in all sectors to play a role. The World Bank Group's 2017 report, *Creating Markets in Ghana: Country Private Sector Diagnostic*, discovered a skills gap in the ICT sector may constrain growth. The private sector has an opportunity to contribute to this field through education and training.¹⁶³

Private sector training providers—whether universities, skills providers, boot camps, or business-to-business curriculum providers—have the chance to develop offerings that tap into the growing demand for digital skills. There is a large market opportunity for business-to-business and business-to-government skilling, particularly focused on basic skills. Investors and operators in Sub-Saharan Africa and Ghana also have a compelling reason to embrace business-to-consumer digital skills, focused mainly on intermediate and advanced skills.

In the next chapter, the role for various stakeholders and the opportunity for private training providers are explored in more detail.

4. Closing the Skills Gap: Insights from Global Innovations and Best Practices

- Researchers explored case studies from eight global and regional digital skills providers to understand best practices in fundamentals of operation, student selection, quality and relevance of training, funding models, and scale
- Short courses are ideal, typically three to 12 months with a mix of instructional methods geared toward practical, rather than theoretical, understanding
- Courses should be strongly market-aligned and focus on employment with program elements ensuring students gain the technical and soft skills required by industry, as well as mentorship and career advice
- Both for-profit and not-for-profit models operate in this space and business models will vary depending on the needs of the payer
- All potential providers must ensure new or expanded digital skills training is aligned to industry needs and fits specific contexts for African learners

This report has shown that the digital skills gap in Sub-Saharan Africa is significant and that market participants are concerned about the effects on growth if it is not addressed. The assessment in chapter 3 of the digital skills market over the next decade in Sub-Saharan Africa and Ghana illustrates the opportunity for digital skills providers to help fill this gap and to make a positive impact in doing so.

Traditional models are failing the world's young people; almost two-thirds of youth employment programs have no impact on youth employment.¹⁶⁴ How can digital skills be effectively taught, and what business models are available? The study explored good practices across basic, intermediate, and advanced skills areas, encompassing a

range of business models with relevance for Sub-Saharan Africa and Ghana. Researchers investigated eight case studies and identified the factors that would matter for investors and operators of digital skills training programs. Considering the urgency of Ghana's digital skills gap and the wide range of its skills development needs, the study sought to glean lessons on best practices. These lessons brought to life, not only what and how the best programs teach, but how they operate and are structured. The section that follows explores the roles of private sector stakeholders in digital skills. It includes frameworks aimed at helping key decision makers introduce digital skills, with insights on what will drive business model success for providers.



Photo: Riccardo Mayer / Shutterstock

LEARNING FROM GLOBAL BEST PRACTICES

The study conducted in-depth studies of eight global and regional programs to understand how to best design and deliver effective solutions. Researchers conducted a global scan that identified more than 160 potential providers of digital skills and then narrowed these to a list of case studies for detailed investigation. These represented numerous skills types, business models, programs, ownership structures, target participants, and regions (see figure 27).

The full, in-depth case studies are covered in Appendix C, but this chapter explores broader lessons in fundamentals of operation, student selection, quality and relevance of training, funding models, and scale.

FUNDAMENTALS OF OPERATION

Mission and Objectives

The organizations assessed see digital skilling as a transformative process with the potential to improve individual lives and communities through inclusion, empowerment, and growth. Many cite the need to meet a skills gap as a major driver for setting up the program and identify this as an issue for both job-seekers and employers.

Andela aims to both advance human opportunity in Africa, where youth lack resources to reach their potential in the technology sector, and to address the global digital skills shortage faced by employers. Anudip seeks to empower underprivileged participants through basic digital skills training, while Microsoft4Africa hopes to build an internal talent pool to support its partner network.

Reach

Factors driving these companies' reach include delivery mode and type of skills taught. Prospective digital skills providers should consider their impact and revenue objectives when planning for reach.

Anudip provides basic skills training to all participants, with some selected intermediate and advanced offerings, and has reached nearly 85,000 participants since 2007. Good Things Foundation has helped more than 1 million people through its Future Digital Inclusion4 program since 2010. Digital House offers intermediate to advanced skills courses and has enrolled roughly 8,000 people since 2016; half of these individuals were trained through business-to-business offerings. Udacity has 70,000 annual participants in its four to six-month industry-aligned Nanodegree programs, which are delivered online.

Figure 27: Case Studies Assessed

PROGRAM	GEOGRAPHY	PROGRAM CHARACTERISTICS			DESCRIPTION
		TYPE	SKILL LEVEL	OWNERSHIP	
Andela	Kenya, Nigeria, Uganda, with administrative offices in the United States	Fellowship	Advanced	Private (for profit)	The initial months of an Andela Fellowship involve immersion simulative training in full-stack development skills. After more than 1,000 hours of instruction, participants begin working for local or international Andela partners as a remote software developer, supported by the Andela ecosystem.
Anudip	India	Skill development course	Basic, Intermediate, some Advanced	Private (non-profit)	Focused on youth and women, from lower economic background, Anudip offers various customized classroom courses on basic digital skills, designed for careers in e-commerce, logistics, retail, banking, and others. They also provide professional IT based vocational training.
Developers in Vogue	Ghana	Coding bootcamp for women	Intermediate, Advanced	Private (non-profit)	Coding bootcamp with a combination of online sessions, group activities and a month long on-site bootcamp. Trains young girls (over 16 years of age) in Ghana on full-stack web development. Provides freelancing, internships and full time job opportunities after completion.
Digital House	Argentina, Brazil	Coding Bootcamp	Intermediate, Advanced	Private (for profit)	Digital House offers technical courses to equip students at all levels to build careers in software development, data science, artificial intelligence, analytics and digital marketing. The program was started with the vision of training new generation coders and digital professionals to help them imagine, innovate and create, while staying competitive in the global economy.
Good Things Foundation	Australia, Kenya, United Kingdom	Large scale digital literacy	Basic	Private (non-profit)	A network of local centers that engage people with community-based learning, offering digital skills based on individual needs. They have programs like Learn My Way - free online website with basic digital skill courses (exploring Internet, online banking, job hunting online, etc.) In 2017, Good Things Foundation launched Digital Life: Kenya, a 12 month pilot project in partnership with the Kenya National Library Service.
Meltwater Entrepreneurial School of Technology	Across Africa with particular focus on Ghana, Nigeria, Kenya, South Africa and Cote d'Ivoire	Incubator; Startup Accelerator	Advanced	Private (non-profit)	Meltwater Entrepreneurial School of Technology offers a 12-month, full time, fully sponsored program in which the students – known as Entrepreneurs in Training – complete a graduate-level course in software development, business and communications. The MEST network is deep in Silicon Valley, London and across Africa.
Microsoft (4Afrika Academy)	Across Africa with on-the-ground presence in Nigeria, Ghana, South Africa, Egypt, Uganda, Kenya, Rwanda, Mauritius, Malawi and Ethiopia	Internship; Apprenticeship and Online programs	Intermediate, Advanced	Corporate supported	Microsoft 4Afrika combine in-classroom trainings with virtual classrooms, real-world learning experiences and online academies that teach digital skills in a digital way. The programs include internships with tech startups, online IT training lessons, and app development workshops
Udacity	190 countries	Massive Open Online Courses	Intermediate, Advanced	Private (for profit)	Massive Open Online Courses platform offering Nanodegrees and vocational courses for professionals with an exclusive focus on digital skills. (Examples: cybersecurity, Google analytics, Android basics, machine learning engineering, iOS development, data analyst, front end web development, deep learning, digital marketing, and others)

Duration

Although program configurations vary, the average duration of digital skills courses lasts less than a year (see figure 28).

Intermediate and advanced training range from three to 12 months, with additional time allotted to internships or placements. In contrast, typical post-secondary degrees include 36 or more months of training. Digital skills courses are shorter in duration due partly to a strong preference for on-the-job training and for programs that have a rapid route to employment. Digital skills training programs can be more quickly deployed to teach Ghana's labor force than traditional post-secondary courses. Prospective digital skills providers in Sub-Saharan Africa should plan for courses that

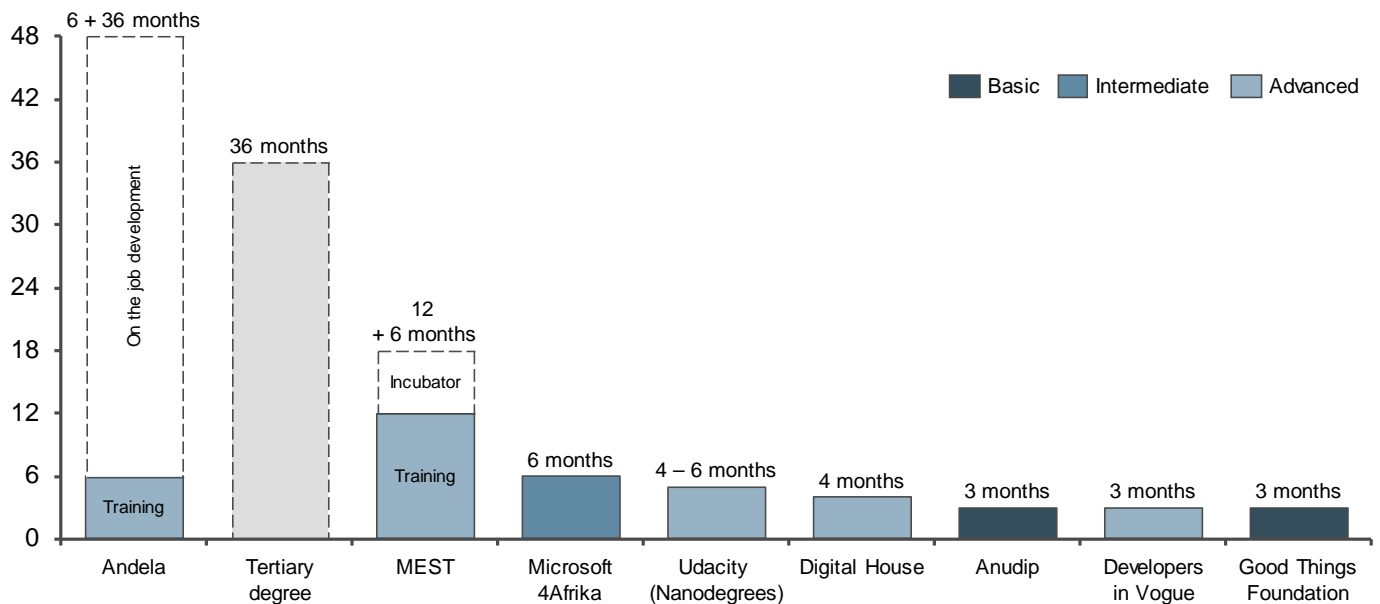
fit within a one-year timeframe or less.

Focus on Soft Skills

Most programs teach broader career skills and emphasize the importance of soft skills in securing employment, an effective complement to more specific digital skills training. These skills would prove an essential ingredient of most digital skills courses in Sub-Saharan Africa, particularly at the intermediate and advanced level. Non-technical skills taught include:

1. **Interview Preparation:** Skills taught to prepare students for the job application process include interviewing, personal branding, and confidence. These skills can be

Figure 28: Average Program Duration, by Skill Type, 2018



instilled, for example, through mock interviews, English language training, and industry networking. Developers in Vogue helps its participants gain skills in public speaking and networking, both important in the interview process.

- 2. Interpersonal Skills:** Skills taught to help students demonstrate they can work well in group settings include communication, leadership, collaboration, and team work. Methods for teaching these skills include extensive use of group projects, peer-to-peer learning, and simulated workplace scenarios. Anudip believes the development of soft skills is important in raising students' employability prospects. It has separate staff to provide soft skills training. Andela judges its fellows by six parameters, of those, initiative, communication, professionalism, and integration are interpersonal or team skills. The organization places a strong focus on building team skills and communication during its program. Some offices conduct daily team-building activities to engage developers, while others hold frequent workshops. Their approach is driven by data that has identified a person's emotional quotient as important for successful placement as his or her intellectual quotient. Digital House looks to develop twenty-first century skills such as team work,

collaboration, and critical thinking to complement technical skills sets. The Meltwater Entrepreneurial School of Technology believes in the importance of communication skills to successfully articulate business ideas and its instructors place a strong emphasis on building these skills through group activities and capstone pitches.

- 3. Character Traits:** Creativity, entrepreneurship, proactivity, adaptability, and curiosity are all essential

Most programs teach broader career skills and emphasize the importance of soft skills in securing employment, an effective complement to more specific digital skills training.

character traits for the digital workplace. These characteristics are facilitated through mentorship, industry networking and interaction, brainstorming project challenges, and opportunities for self-led learning. Digital House focuses on teaching creativity as one of its twenty-first century skills imparted and MEST seeks to develop leadership skills in its cohort.

STUDENT SELECTION AND DIVERSITY CONSIDERATIONS

Student selection depends on the level of skills offered. Basic courses often have few barriers to entry, while many advanced courses ask potential students to undergo a detailed application process. This can include an application form, online assessment, group interview, one-on-one

interview, and other measures such as Andela's product development simulation. Prospective digital skills providers in Sub-Saharan Africa should look to match the selection process with desired outcomes. Programs targeted at an elite corps of developers will require rigorous, lengthy and highly selective approaches, while those targeting less experienced, but enthusiastic, participants will require approaches that focus more on personal commitment and fit. Courses on basic and intermediate skills require fewer prerequisites and in many cases can be open to all, although programs such as Anudip find it useful to secure commitment through a small payment.

Advanced courses receive very high applicant-to-seat ratios, with an acceptance rate as low as 1 percent. This indicates the high returns individuals can gain. A program's reputation

INNOVATIONS IN STUDENT SELECTION: SPOTLIGHT ON ANDELA

Andela provides four-year fellowships to software engineers in Africa. Fellows receive six months of training in advanced technical software development skills, followed by employment in partner technology companies.

Andela has developed a rigorous applicant vetting process that enables the organization to process a large number of applications and find the most talented candidates; only 0.7 percent of applicants are selected.

The four-step selection process includes an online personality test, technical assessment, in-person interview, and a two-week "sprint." The personality test and application are online and free, after which applicants gain access to Andela's Home Study Curriculum to prepare them for the next round of technical assessments. These test applicants' python or JavaScript skills through virtual lab assignments. Candidates who make it through the technical assessments are selected for an in-person interview with a panel of Andela staff members. Final candidates are invited to participate in the sprint, comprising one week of self-study and one week of product development at an Andela campus. This allows the program to identify participants who are well-equipped to keep up with the demanding program requirements, as well as assess candidates' independent working and team skills.

The program has increased its focus on team skills and emotional quotient, which its experience indicates are essential to a successful developer. This was identified through data from psychometric tests of fellows and fellow performance tracking during the program. Andela leverages a free online learning platform, Andela Learning Community, to help find applicants. This platform serves as Andela's "scouting" medium, as it allows the company to track learner progress over time by providing data points to identify potential participants who are likely to perform well in the program. Andela also helps repeat applicants improve their skills through the platform.

For more information, visit: <https://andela.com/>

can also lead to a higher volume of applications. Andela's program is a well-respected, fully-paid fellowship that draws 20 to 30 future aspiring technology workers who train for six months and then participate in a 3.5-year work placement. The organization gets thousands more applicants than it can absorb; it has received more than 100,000 applications since 2014. Developers in Vogue seeks applicants with little to no background in technology and has a 20:1 applicant to seat ratio. Its application period is followed by a two-month period of assignments given to 45 selected applicants who complete online weekly assignments and receive grades for performance and team work. This process is an effective way to determine applicant commitment and learning aptitude. Digital House also assigns pre-work. It has 30 to 40 seats available per course and requires students to complete pre-work and an online assessment before entry. Around 85 percent of students applying to Digital House successfully complete the pre-work and are admitted.

MEST targets Africans who are interested in starting their own software companies. It requires an online form followed by in-person assessments and a series of tests to evaluate applicants' analytical thinking, business acumen, and interest in technical entrepreneurship. The program received more than 2,500 applications in 2018 with roughly 1,000 individuals making it past the initial application filter. Its interview panels are made up of business professionals, including general managers and recruitment managers.

Udacity, a Massive Open Online Course provider, has selection criteria for some courses. Udacity's Nanodegree programs are open to all learners except for the advanced ones. These have specific prerequisites to ensure the right fit and prevent dropouts.

Basic skills courses such as Good Things Foundation and Anudip, which aim to build broad digital competencies, are typically open admissions and may not have an application process. This sometimes reflect the lower marginal cost of additional participants and often is part of the organization's mission. Anudip, however, has experienced challenges in providing relevant curriculum for less sophisticated learners. The organization's target participants often do not have extensive educational experience and the idea of pursuing further studies may be new to them. Anudip overcomes this by providing a clear roadmap for learners from training to certification and employment.

Programs also focus on ensuring a strong representation from different backgrounds. For example:

- **Gender Diversity:** MEST has grown from 10 percent female students in 2008 to 30 percent in 2018, and the organization is working to increase that number. To develop this initiative, it recently launched a partnership with nonprofit STEMbees, founded by MEST alumni. The partnership is aimed at providing mentorship to young women looking to pursue careers in science and technology fields. Andela aims to ensure at least 30 percent of its participants are women and has set up all female recruitment cycles to encourage women to apply. The company organizes "level-up" programs and workshops for women in partnership with corporations such as Microsoft. Developers in Vogue hopes to attract women from other cities in Ghana and the wider African continent by launching an almost entirely online version of its boot camp. This would require monthly or bi-monthly meet-ups instead of a full month on-site.
- **Economic and Geographic Diversity:** Digital House encourages applicants from a range of economic backgrounds by offering need-based scholarships that can cover as much as 45 percent of tuition fees. Udacity has launched over 15 scholarship programs in partnership with leading corporations since 2017 that have benefited more than 200,000 students from over 150 countries. Developers in Vogue hopes to attract women from other cities in Ghana and the wider African continent by

launching an almost completely online version of its boot camp. This would require monthly or bi-monthly meet-ups instead of a full month on-site.

- **Socially Excluded:** Good Things Foundation seeks to reach people with limited IT experience, including unemployed, disabled, and low-skilled people, through a network of 5,000 online centers at libraries, small community organizations, and other locations. The Online Centres Network is located in the heart of disadvantaged communities. The open-door, people-centric model of Online Centres is less intimidating to learners who may have had a negative experience in formal education or limited education at all. Some cultural groups may be unwilling to attend mainstream training for cultural reasons, such as mixed gender classrooms. The foundation tries to eliminate unease by placing training within familiar community centers. Some centers also offer childcare to allow full-time training for parents.

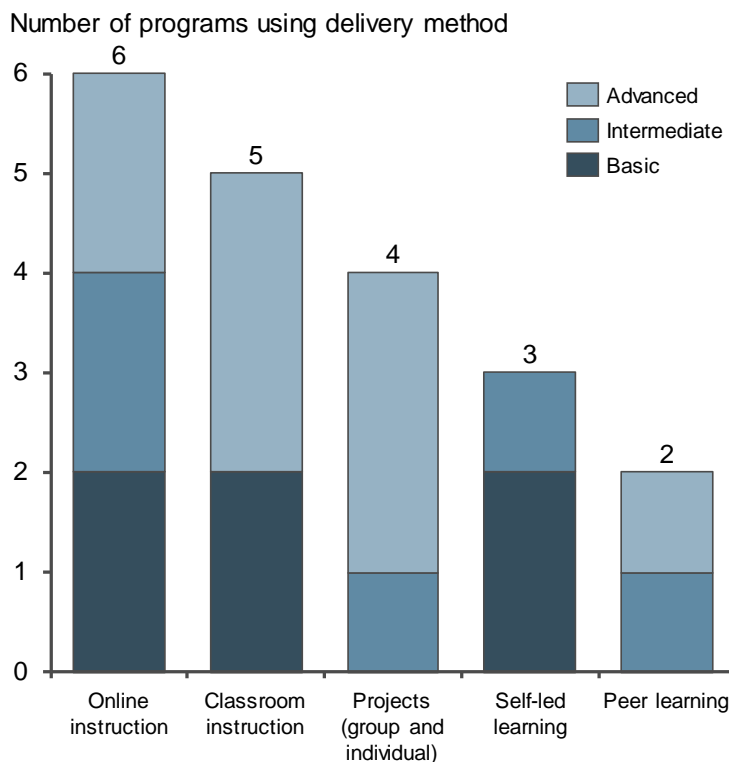
Prospective digital skills providers in Sub-Saharan Africa should consider elements of diversity—economic, gender, geographic, disability, and others—they would seek to address and build these into their original program design.

QUALITY AND RELEVANCE OF TRAINING

Programs use numerous instructional methods for digital skills training. Advanced skill programs are more likely to deploy a variety of instructional methods, while basic skills providers use fewer (see figure 29). These include online, classroom, project-based, self-led, and peer learning. These teaching methods are not mutually exclusive. Self-led courses, for example, can be online.

- **Online instruction** is used across most programs to increase flexibility, provide students with multiple ways to access course content, and track progress in real-time. Udacity is an example of an exclusively online learning platform that uses a range of student tracking and

Figure 29: Instructional Methods Employed, by Level of Skills Training, 2018



feedback systems to ensure success. Digital House students in blended courses have a flipped classroom experience where they learn theory at home online.

- b. **Classroom instruction** remains one of the core training activities. It usually serves as the foundation of most advanced skills programs as it allows for a greater transfer of knowledge. Andela and MEST, both advanced programs, rely on extensive classroom instruction to help students develop complex skills. Anudip's classroom lectures focus on IT skills; while other topics are self-led. Digital House's flipped classroom model relies on online learning at home and practical assignments during in-person classroom sessions. This optimizes face-time with teachers.
- c. **Project-based learning** is a widely used method, particularly in intermediate and advanced courses, that allows students to apply their lessons and "learn by doing." MEST participants undertake four group projects over 12 months to simulate the process of launching a new business. In a similar vein, 4Afrika's AppFactory participants work alongside senior software engineers on a real project for a partner organization that provides both project and team experience. Digital House integrates co-learning projects that simulate real-life situations like those in the labor market. Learners develop group projects such as a website or mobile application. Students in Udacity's Nanodegree programs are required to work on projects designed by industry experts, receive feedback by industry participants, and train to produce portfolio-ready results.

The first six months of Andela's program are spent exclusively on project-based learning. Fellows work on product teams at Andela offices writing code and incorporating feedback from senior engineers. This training model mimics the process of learning on the job; "instructors" are senior colleagues. Team work on projects builds a sense of community, which students cite as important for learning. "You must join a community," an Andela fellow said. "It may be good to work alone, but it is much better to work in a team." MEST participants also

PERSONALIZED LEARNING: SPOTLIGHT ON GOOD THINGS FOUNDATION

Good Things Foundation is a social change organization headquartered in the United Kingdom. The organization was started in the United Kingdom and has now expanded to Australia and Kenya, reaching 2 million people. Its Future Digital Inclusion program provides basic digital skills training to individuals with limited digital experience. The FDI program delivery is personalized, informal, and flexible, allowing participants to learn skills of their choice at their own pace. The program is delivered through members of the Online Centres Network, which is made up of 5,000 libraries, community centers, business, social housing associations, and other organizations. Participants have access to free or low-cost Internet at these centers, as well as a variety of FDI resources such as the Learn My Way platform, a website built by Good Things Foundation that delivers free digital skills online courses. This platform is easily accessible to those outside the Online Centres and has been designed to ensure transferability of content.

Online Centres typically speak with participants prior to the program to understand their current skill levels and learning goals. This allows instructors to tailor content towards individual needs and provide them with group or individual sessions according to their preferences.

For more information, visit:

<https://www.goodthingsfoundation.org/>

note that practical project-based methodologies are useful for learning. “I found the quarterly capstone projects very useful as we actually had to go out and try to get customers for our businesses,” a MEST student said. “Entrepreneurship is so practical, so this element of practical learning was useful.”

d. **Self-led learning** offers students an opportunity to develop proactive habits and independent thinking. This can include content-delivery mediums that keep users engaged while providing personalized performance-based learning. Anudip uses its learning management system to deliver gamified course content to learners, who compete for high scores across the platform. Its basic courses—digital literacy, workplace readiness, and English—are typically offered through self-led learning. Microsoft’s Interns4Afrika participants are recruited locally for sales, marketing, or technical support roles with high ICT intensity for six months. Interns work in a virtual classroom for the first three months of their internship with self-led elements.

e. **Peer learning** is used by programs to reinforce lessons and encourage interpersonal skills. Developers in Vogue is focused on building communities within its student network and implements a “pair programming” initiative in which two participants share a workstation. The knowledge exchange that takes place through this setup helps to generate a consistent feedback cycle and has led to an improved quality of coding. Good Things Foundation leverages Digital Champions, former participants of the program, who come back to the centers to help train and mentor current participants. Digital champions are typically better equipped to understand the challenges that learners face and the informal, face-to-face approach helps make participants more comfortable.

Prospective providers should consider what configuration of instructional methods aids learning goals, ensures retention, and optimizes costs.

Modalities

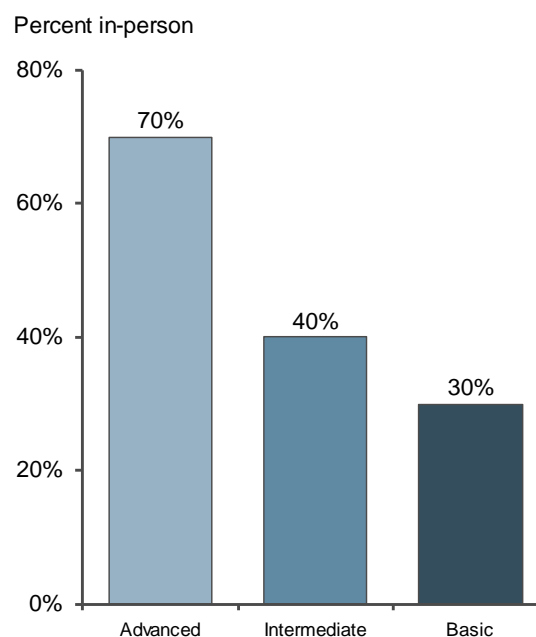
In-person training is typically relied on more in programs that seek to build advanced digital skills (see figure 30). This is because face-to-face, practical instruction is often required to convey complex ideas: 70 percent of the case studies that offered in-person training taught advanced skills, while only 30 percent taught basic skills.

Remote training also brings advantages of cost efficiency, as content can be shared at different times and replicated at scale. Digital skills training providers should be conscious of striking the right balance between the more hands-on learning that takes place in classrooms, and the level of scale that can be achieved with remote learning. This will vary based on the level of skills taught and the size of the target audience.

Drivers of Program Success

Students named three factors that drove a program’s success: hands-on-training, faculty with practical experience, and current ties to industry.

Figure 30: Average Proportion of Training Delivered in-Person, 2018



Hands-on-Training: Students in most programs cited hands-on training as critical to their learning and one of the fastest ways to accelerate learning. Programs use a range of methods to simulate or carry out actual business scenarios and give students hands-on experience. Developers in Vogue students compete in hackathons to pressure-test their coding skills, while MEST participants work on developing a business idea, build it through capstone projects, and give an investor pitch at the end of the program. Andela teaches its developers on the job, with fellows grouped in “pods” with senior developers for support. Senior developers are experts in the field of software engineering with more than five years of experience and are recruited from top tech firms in Africa and around the world. Digital House students work in groups on projects with real-world applications. The course

content is reviewed annually to ensure it is relevant and that projects simulate accurate, real-life scenarios.

Microsoft4Africa AppFactory participants work alongside senior software engineers on real-world projects and develop practical digital skills over a six-month period.

Faculty with Practical Experience: Alumni from numerous programs stressed the importance of trainers with practical experience in the areas they taught. Digital skills are inherently practical, and staff that can teach by example and understand business applications for these skills can ensure their relevance to market needs. MEST uses trainers that are often developers in major IT companies or former alumni who have started their own ventures. All senior faculty members have at least 20 years of experience in their industries and come from international consulting

DIVERSITY OF INSTRUCTIONAL APPROACHES: SPOTLIGHT ON MEST

The Meltwater Entrepreneurial School of Technology is a full time, 12-month program in Accra, Ghana, that provides entrepreneurship training in business, communication, and advanced digital skills in software development to graduate-level African participants.

The program uses multiple instructional methods throughout the year. These approaches focus on honing different skill sets for participants to receive well-rounded training. The program’s emphasis on entrepreneurship is also reflected in its yearly changes to curriculum, which shift to match current skills in demand in the market. MEST has a network of 300 alumni.

MEST Entrepreneurs in Training complete three capstone projects during the program. EITs are required to develop their business ideas and simulate the entire process up to market launch. This enables them to understand how to start their own businesses before investors evaluate their final pitches.

Students spend roughly 80 percent of their learning in classrooms, while the remainder is spent on lectures, field work, market research, events, and group projects. These activities allow participants to receive an interactive learning experience.

Apart from focusing on technical skills, the program’s emphasis on business and communication skills have emerged as important in local employment. The strong partner network at MEST further allows participants to engage with and receive mentorship from pioneers in the technology industry. Throughout the program, guest lecturers also travel to Ghana to mentor and teach EITs.

For more information, visit: <https://meltwater.org/>

PROJECT-BASED LEARNING APPROACH: SPOTLIGHT ON DIGITAL HOUSE

Digital House is an education company in Argentina and Brazil that delivers intermediate and advanced digital skills through vocational training and undergraduate and K-12 partnerships. It also offers executive education programs to technology professionals. The program has around 4,000 student participants and 4,700 business consumers who send their employees for customized training programs. Learning takes place on-site or via blended technical courses at Digital House campuses.

Within its blended-learning courses, Digital House uses a flipped classroom method. This technique requires students to learn theoretical content online at home and participate in practical assignments in the classroom. The model ensures that students make the most of their in-person learning with teachers.

The program also places a large emphasis on project-based learning, through which students work on group projects such as website or mobile application development. These projects are specifically designed to imitate real-life scenarios that occur in the labor market. Each group submits a final project that is evaluated by the program faculty. Carlos Najun Dubos, a program alumnus, worked on a group project along with two other members to develop a real e-commerce site for one of his teammate's backpack businesses. He found that his project helped him apply his knowledge within a practical framework. Digital House campuses further reflect this collaborative learning philosophy by providing co-working spaces for students to work on group projects or interact with teachers after class.

For more information, visit: <https://www.digitalhouse.com/>

firms, Silicon Valley start-ups, and software companies. Throughout the program, guest lecturers also travel to Ghana to mentor and network with students. Digital House instructors bring deep experience in professional, entrepreneurial, and research fields.

Alignment and Links to Industry: Students also value a program's links with industry. Programs can provide ties to industry through curriculum that ensures the skills taught match demand, guest lecturers who help connect the classroom to the broader industry, campus visits, and networking events that help students put their learning in context. Industry-linked programs also benefit potential employers, who use these links to the classroom as a talent pipeline for recruitment. Anudip asks prospective employers to help design the curriculum and then outsources the training program to them. Developers in Vogue involves

industry through a network of largely Ghanaian companies that often provide employment and internship opportunities. It uses mentors from the technology industry, employs teachers with an understanding of industry needs, and prioritizes collaboration with local companies on sessions and workshops. Digital House guest lecturers are industry leaders who teach specific classes within a module. MEST participants also are expected to make use of the organization's partner network as a part of their learning experience. They are given the opportunity to do so with more than 30 organizations, including potential investors and leaders in the technology sector who provide mentorship and help foster the growth of African start-ups. The program also brings in executives of major companies and other guest speakers for interactive dinners. Udacity works with more than 100 global companies and ensures that its course content is relevant for meeting today's industry needs.

Students' believe these features are essential to effective digital skills programs, and prospective providers should consider new offerings that have them.

Employability and Placement Activities

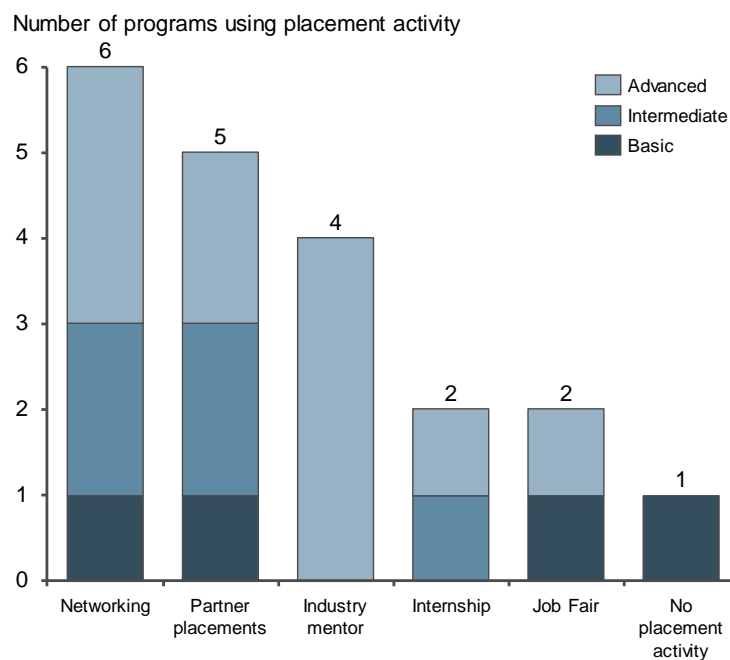
Employability is a core focus for most programs. The most common ways to support student links to the job market are industry networking and partner placements (see figure 31). Some of the case study approaches are detailed below.

- Anudip has placed more than 60,000 graduates in jobs and has a variety of employability initiatives. It organizes regular campus visits to potential employers and has a corporate placement unit with ties to more than 200 IT-enabled services and e-commerce employers including Amazon, Tata Consultancy Services, and Flipkart. Anudip also has established a technology services firm, iMerit, that provides an employment pathway for learners. It takes in about 600 graduates each year. Many Anudip graduates relocate for jobs when their course ends. The move to a new, larger city can feel daunting. Anudip helps

ease the transition by providing accommodation placement services.

- Microsoft4Afrika seeks to address two challenges in Africa: high youth unemployment and the shortage of talented IT employees across the continent. Microsoft partner organizations are able to hire Microsoft-certified interns and receive recruitment and training support from Microsoft. Microsoft's network of around 1,200 partner organizations in Africa provides internship opportunities that are beneficial for participants and placement organizations. These partner organizations host interns and offer successful students permanent roles in their companies. Interns4Afrika has taught over 530 interns, 450 of whom were recruited by their host organizations after their internship. More than 1,400 apprentices have graduated from the network of AppFactories, 1,200 of whom secured employment within three months of graduating.

Figure 31: Incidence of Placement Activities, by Type, 2018



- Andela's program has employability embedded in the model; after a six-month training period, fellows are staffed as full-time team members at one of Andela's offices. Graduates typically go on to full-time employment as software engineers for top global or local technology companies, secure employment with Andela in positions such as senior developers, or become entrepreneurs, supported in part through the organization's Entrepreneurship Center. This serves as a local technology incubator, providing entrepreneurs with the guidance to brainstorm, network, prototype, and set up operations. The initiative is expected to result in the creation of new local businesses.
- Developers in Vogue aims to provide aspiring women developers with an opportunity to hone their skills and receive support in finding jobs. Participants are encouraged to "earn while they learn." They are connected to freelance opportunities and internships in Developers in Vogue's network, which they can later leverage to help them find jobs. Half of alumni (30 women) have secured employment within less than a year of completing the program and 70 percent of them found jobs through the organization's network.
- Digital House students and graduates have access to an online jobs board that includes full-time and part-time opportunities in technology fields. Digital House conducts workshops with employers that focus on preparing resumes and developing effective strategies for applying to jobs. Together they hold a "recruiting day" where around 30 of the largest companies in the local technology industry come to interview students for jobs. Digital House graduates who are job hunting have placement rates greater than 95 percent, with around three months to pay back course fees.
- MEST graduates can pitch their business ideas at the end of the program to a board of investors to secure seed funding. Some entrepreneurs use their business skills and experience to seek employment opportunities in professional services such as consulting. MEST often gets experts from large software companies such as Facebook,

Microsoft, and Uber, who offer career opportunities to the most technologically adept students. MEST also offers an incubator program, which provides seed funding, working space, and hands-on support for start-ups. The flagship incubator is located in Accra, Ghana.

- Udacity has employability at the heart of its approach. As its vice president of learning noted, "We never start anything out of academic interest. We always start from the job and from the work and from the requirements." Udacity offers industry-relevant curriculum and effective career support to its Nanodegree graduates, making the program attractive to both students and employers. Students enrolled in Nanodegree programs benefit from personalized career support and assistance in accessing employment opportunities. Making career support an incentive has helped increase pass rates beyond 50 people in some Nanodegree programs.
- Good Things Foundation, which does not have an explicit employment focus, tracks metrics of student progress such as progression to further learning. This was achieved by 90 percent of learners in 2016 and 2017.

Digital skills providers seeking to offer programs in Sub-Saharan Africa should consider how to embed employability across the learner experience.

Mentorship

Employability-focused training programs use industry mentorship as a way to support learners when the program ends. Many programs cultivate more than one mentor relationship to offer different benefits to students. Mentors are sometimes program alumni who can provide guidance and help extend network reach, as they do in MEST, Anudip, and Andela—or industry representatives, such as in Developers in Vogue, Digital House, and MEST. Mentors are important in providing a template for successful post-program placement and helping participants build the network required to move into their desired career path. Developers in Vogue matches mentors to participants' chosen career path and provides in-person or remote career

guidance for at least an hour a week. Microsoft4Afrika's Interns4Afrika program combines mentorship from partner organizations with virtual classroom training at the beginning of each program. Companies and their staff are expected to play a role in training and mentoring young talent.

Digital skills providers in Sub-Saharan Africa should consider how to offer students the mentorship that can propel them into jobs.

FUNDING MODELS

A training provider's business model depends on the type of skills they want to teach.

- **Private for-Profit Programs:** For-profit models must offer participants a compelling reason to sacrifice their own money or time in return for training. Upon completion of the programs, participants can expect payback through improved employment. These can generate revenue to cover the cost of operations through fees charged to participants. In other models, the payer is a third party such as government. Andela offers free training to participants in return for a 3.5-year employment commitment with a company afterward. The model is linked directly to employer needs—namely, a reliable pipeline of talent without the costs or delays of hiring (there are five open jobs for every one software developer in the United States). This ensures continued relevance and funding for Andela.

Digital House focuses on working professionals, most of whom can afford to pay for its classes. It offers nine courses to help learners become more competitive professionally, as well as six executive programs for managers, professionals, and entrepreneurs in technology. There are on-site and blended options available to suit different learner needs. The organization also offers customized training programs to companies, which has helped it gain some 4,000 learners through business-to-business offerings. Digital House graduates, many of whom are already in jobs, cite an almost 40 percent increase in salaries on average.

Udacity's sustainability is also driven by its employer alignment and focus on outcomes. The vast majority of its learners are early- to mid-career professionals. Early-career professionals often are looking to launch a new career in technology, while mid-to-late career professionals seek to enhance their skills within their current professions. Nanodegree graduates in the United States and Canada have reported average salary increases of 38 percent through their new jobs, which helps justify an individual's investment in the course. Udacity has witnessed growing demand for its business-to-business enterprise services. These services include helping businesses meet their growing needs for tech-savvy workers by training their employees and job candidates.

- **Private Nonprofit:** Private nonprofit programs rely at least in part on government and grant funding. Many do not charge fees to participants, and those that do, usually do not cover costs of delivery because of a desire to keep participant fees low. Many of these organizations have social aims such as the empowerment of youth or women or the digital inclusion of marginalized groups. Anudip's founder conducted an initial study in 2005 that showed an increase in local employment could dramatically improve the lives of marginalized people; so he created Anudip. While the organization focuses on employability and charges some fees, it continues to rely on institutional donors such as The Michael & Susan Dell Foundation and Omidyar Network for 80 percent of its funding.

Funders include both independent donor agencies and government agencies, in what can be understood as business-to-government service arrangements. In other words, the provider offers a service that delivers value to the public sector. Good Things Foundation offers a Future Digital Inclusion initiative that teaches basic digital skills to those with limited IT experience, including unemployed, disabled, and low-skilled people. The foundation runs as a charitable organization and receives almost 80 percent of its funding from the government. The remaining 20 percent comes from companies, trusts, and foundations. As learners develop digital skills, they begin to use cost-effective online channels for their transactions with public

services. Reduction in demand for local council services is estimated to have reached \$64 million.

In another example, not-for-profit start-up Developers in Vogue aims to tackle gender disparity in Ghana's digital economy. The organization secures 55 percent of current funding from grants but plans to start charging tuition fees in 2019, which may lower long-term grant reliance.

Developers in Vogue secures 25 percent of its funding from corporations, while Anudip receives funding from corporate partners including Accenture and Cisco. MEST was established by the Meltwater Foundation, a nonprofit arm of Meltwater, a Norwegian software company whose long-term goal is to create wealth and increase jobs in Africa. MEST also ensures sustainability because it secures a minority equity stake in the MEST Incubator projects to which it awards \$1 million in seed funding each year.

- **Corporate-supported:** Companies may also choose to sponsor a skills-training program if it enables them to generate increased value for the company or meets corporate social responsibility aims. Corporate-supported

programs like Microsoft4Africa invest in the pool of talent in Africa. Microsoft's goal through 4Afrika is to invest in the continent's technology ecosystem, develop talent, and increase the skilled workforce. This in turn helps Microsoft access this market for both a talent pipeline and future customers. The 4Afrika initiative functions as a market and ecosystem development engine for Microsoft because it increases recognition of Microsoft products and its partner organizations benefit from hires tied to the company's ecosystem. These participants are trained with the latest technology solutions and receive Microsoft certification.

Operators should start with the needs of potential payers when considering business models for digital skills training (see figure 32). These can be individuals, corporations, a corporate and government mix, or a blend of government and donors. Each of these stakeholders have unique needs, and potential interventions vary based on them. Providers keen to offer business-to-consumer training must ensure they are clearly meeting individual needs for improving employment chances, typically in the form of payback on

Figure 32: A Path to Business Model Viability

1. Potential payers	2. Payer needs	3. Potential interventions	4. Relevant skills	5. Implications for design	6. Examples
Individual	Secure a better job	<ul style="list-style-type: none"> Provide skills recognized by employers and resulting in improved career outcomes 	Advanced Intermediate	<ul style="list-style-type: none"> Clear path to employability Market-aligned curriculum Visible placement activities 	<ul style="list-style-type: none"> Andela guarantees employment post training Digital House updates its courses three times a year using industry feedback
Corporate	Address talent shortage	<ul style="list-style-type: none"> Create a pipeline of previously untapped talent Potentially offer access to less expensive labor offshore 	Advanced Intermediate	<ul style="list-style-type: none"> Rigorous selection process Inbuilt pathway from training to employment (and measures to avoid attrition) 	<ul style="list-style-type: none"> 4Afrika has an applicant to seat ratio of ~100 Under its T2E model, Anudip guarantees employment with a partner organization
Corporate / Government	Improve technology industry ecosystem	<ul style="list-style-type: none"> Improve average skill level Link companies to each other Link individuals and companies 	Advanced Intermediate	<ul style="list-style-type: none"> Balance company needs with industry requirements Leverage business-to-business/business-to-government partnerships to promote linkages 	<ul style="list-style-type: none"> MEST graduates go on to found technology startups to feed Africa's tech ecosystem 4Afrika graduates bring skills into Microsoft partner organizations
Government	Economic development	<ul style="list-style-type: none"> Build human capital Improve economic competitiveness Improve access to jobs or services 	All skill levels	<ul style="list-style-type: none"> Focus on basic skills training as a priority Aim to fill a gap which is not currently catered to by individual payers or corporate funders Quantify impact of digital inclusion 	<ul style="list-style-type: none"> Good Things Foundation works with governments to improve basic digital skills and quantifies the economic impact of digital inclusion
Donors	Social inclusion	<ul style="list-style-type: none"> Promote innovation Promote social inclusion 	All skill levels	<ul style="list-style-type: none"> Fill a gap which is not currently catered to by individual payers or corporate funders Focus on basic skills programs or those reaching marginalized groups 	<ul style="list-style-type: none"> DIV supports the development of women's coding talent Good Things Foundation's basic skills program focuses on personal empowerment, which has a range of indirect benefits in the community

training investments. Programs working with government may need to demonstrate either economic impact or social and economic inclusion ambitions, or both.

SCALE

Program scalability is driven by three key factors: delivery efficiency, partner networks, and employment orientation.

1. **Delivery Efficiency:** Programs with simple delivery methods are easier to scale for two reasons. First, they have lower costs to serve each participant, decreasing the investment required. Second, they can reach a greater target audience. Udacity's online-only offering has a very low cost-per-student, and its lack of a fixed geographical presence enables easier global access. Anudip's network of more than 100 resource centers, combined with a blended online learning management platform, gives the program extensive reach across rural areas in India. Good Things Foundation has developed training content, including the online Learn My Way platform, which can be easily distributed across a wide range of partner centers. Digital House has successfully expanded to Brazil, although that program has an onsite component for all courses. The organization is building a larger technology platform that provides purely online courses and should promote the company's growth. The company also is considering increasing its corporate training options through more digital content.
2. **Partner Networks:** Partner networks help to decrease the time and resources required when scaling up. Partners can provide curriculum development, physical resources like classroom space and hardware, a pool of trainers and mentors, and potential employment opportunities for graduates. 4Afrika leverages Microsoft's extensive partner network to help expand its AppFactory presence and to find trainers for the program. An AppFactory "host" provides the physical space and training resources for the program. This often is a partner university or IT company with an interest in building the pool of tech talent in the country, such as the United States International University Africa in Kenya.

TEACHING DIGITAL SKILLS IN INFRASTRUCTURE-LIGHT SETTINGS: SPOTLIGHT ON ANUDIP FOUNDATION

Anudip is a nonprofit that provides digital skills training to underprivileged women and youth in India with the goal of empowering them to gain employment and earn a steady income. Anudip teaches basic skills, with additional intermediate and advanced skills depending on participant interests. The program has had over 85,000 learners from across India and boasts a 75 percent job placement rate.

Participants can take courses in over 20 different digital skills subjects, along with continuous soft skills development. Program instruction usually takes place through blended learning, with in-person lessons at Anudip's resource centers and individual learning on laptops or tablets that the organization loans to students.

Anudip has been successful in teaching digital skills despite Internet connectivity issues in rural areas in India. Its ability to address this lies in a blended-learning platform, which can be used without either electricity or Internet access. This learning management system is available offline, giving participants access to content through a battery-powered router and projector. The offline uses of Anudip's learning management system provide access to a much wider audience of learners and addresses a key barrier to digital skills training in settings with minimal infrastructure. It also helps reduce program drop-out rates associated with travel, as learners are able to gain access remotely and often do so in group settings. This has also brought down Anudip's capacity-related costs.

For more information, visit:

<https://www.anudip.org/>

Good Things Foundation distributes its Future Digital Inclusion training through a broad network known as Online Centres, the majority of which are partner-operated community centers. All training material is developed internally by the Good Things Foundation and distributed to the Online Centres Network. The program offers physical training materials, as well as the online Learn My Way platform and Capture IT. Capture IT is a tool outside Learn My Way, which tracks skills acquired by participants and develops records for them. The information is saved within the program's Management Information Tool and is accessible to all centers within the network. In its recent expansion to Kenya, Good Things Foundation has helped more than 1,000 people gain new digital skills through a partnership with the Kenyan National Library Service.

3. **Employment Orientation:** Most programs assessed focus on graduate employability, a key part of an organization's ability to sustain itself and grow. Graduate employability drives the program's reputation, demand for its courses from students, and links to partner employers. Programs that deliver high employability will also find it easier to raise capital as donors and investors will see their impact.

Several common challenges emerge as programs begin to scale. One lies in **finding suitable participants**. Programs must attract and retain high caliber students to ensure the quality of the program. The number of applicants tends to increase as a program expands, and it becomes more expensive to filter them. Programs can mitigate this by maintaining a stringent recruitment process. Andela has a recruitment function that maintains a well-structured and strict process that is consistent across all markets. This has helped ensure quality control across its student base.

Another challenge comes from **securing skilled staff**. Advanced courses typically have a high proportion of in-person training. This means programs need to grow their faculty as a program expands. Skilled faculty members are considered crucial in helping participants become employable. A decline in training standards would impact

EMPLOYMENT-ORIENTED NANODEGREES: SPOTLIGHT ON UDACITY

Udacity is a Massive Open Online Course (MOOC) provider delivering specialized four-to-six month intermediate and advanced digital skills courses. Their Nanodegree programs allow students to complete a set of courses in a particular chosen discipline, after which they receive certification recognized by Udacity partners and notable employers such as Amazon, eBay, and AT&T. Udacity's cost of \$1000 for a Nanodegree program is significantly lower than that of a traditional college degree, making it an attractive option for individuals looking to hone their digital skills. Udacity has roughly 70,000 Nanodegree alumni across the globe.

Students participate in online assignments that have clear timelines, while they receive real-time mentorship from Udacity staff. Mentors provide guidance to students on a regular basis and are available to answer questions through the program web application. Students participate in project labs, allowing them to work on complex projects that are later evaluated by experts in the field. Udacity provides courses in data analytics, machine learning, web and mobile app development, artificial intelligence, self-driving cars, and flying cars. Nanodegree graduates have reported an average annual salary growth of 38 percent in the United States and Canada.

For more information, visit:

<https://www.udacity.com/>

the viability of a program. One way to address this is by leveraging an organization's large pool of industry partners as instructors, such as 4Afrika and MEST do. Given the importance of industry links, this helps programs to grow while maintaining standards.

Building industry partner networks also presents challenges. It requires a critical mass before a network can be formed. Thus, early-stage programs often struggle to access the networks necessary to scale. Leveraging a partner's existing network can help solve this problem. Anudip, for example, worked with the National Skill Development Corporation in India to leverage its large network of industry partners and employers.

The final challenge involves **maintaining a program's market relevance**. Industry-led training is critical in ensuring the skills taught match what is demanded by employers. The need to consistently update course content is important but time and resource intensive. Digital House offers an example of an organization that maintains close ties to industry. It refreshes course content multiple times each year with the help of industry partners who aid in curriculum development. In turn, these industry partners are given access to top students.

STAKEHOLDER OPPORTUNITIES WITH DIGITAL SKILLS

This study demonstrates that age affects when to teach certain digital skills (see figure 33). Current efforts do not sufficiently meet labor market needs at any level. Providers can use a range of potential models to address these gaps, but the most effective solution will depend on the skill level being taught. For basic skills, schools are perceived as the ideal platform for delivery. For intermediate skills, both school age and pre-employment or post-secondary education are important. For advanced skills, both pre-employment or post-secondary education and lifelong learning are potential opportunities for skills improvement, including innovative models like boot camps.

Stakeholders will need to take different actions to manage the demand-supply imbalance in digital skills. Some can provide business-to-consumer training, others may involve business-to-business or business to government services, and still others may include ecosystem-building activities that contribute to broader sector development.

Recommendations for Private Sector Operators

Case studies in this section provide insights into ways digital skills providers in Sub-Saharan Africa can develop viable business and operating models.

Recommendations for private sector operators considering expansion in this field vary depending on the company's profile, existing footprint in Africa, and experience teaching digital skills. The most likely operators to offer digital skills in the region are education providers already offering digital skills who may wish to expand, education providers who do not offer digital skills lessons but may look to do so, mainstream African businesses considering expanding into digital skills offerings, digital skills providers outside Africa considering expansion to the continent, and technology companies.

Figure 33: Digital Skill Training by Education Stage, by Level of Skill

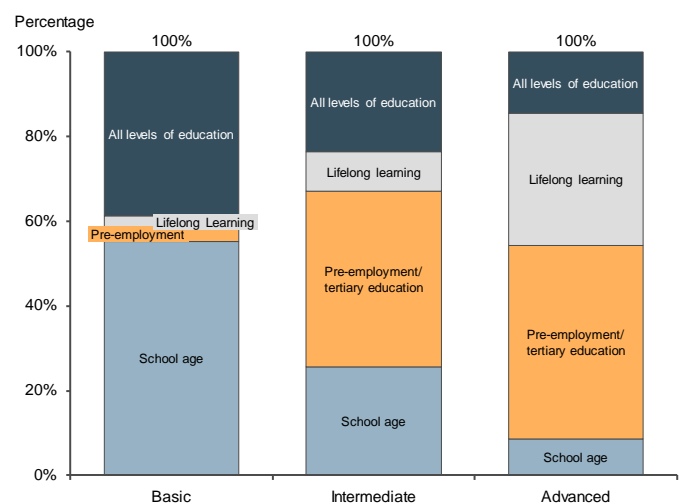


Figure 34: Opportunity Framework for Stakeholders

	PROVIDE TRAINING	DEVELOP ECOSYSTEM
POLICYMAKERS	<ol style="list-style-type: none"> Partner with training or curriculum providers to roll out digital skill training in schools, colleges and communities Develop digital skills courses with public institutions (for example, technical and vocational education and training, primary, secondary) 	<ol style="list-style-type: none"> Create frameworks for public education institutions to leverage up-to-date digital skills training content Continue to expand infrastructure Create frameworks for public private partnerships
PRIVATE EDUCATION OPERATORS/SERVICE PROVIDERS	<ol style="list-style-type: none"> Provide training directly to learners Partner with government to provide curriculum or direct training (for example, in schools) Partner with corporates to provide curriculum or direct training 	<ol style="list-style-type: none"> Support operators and public sector to upgrade content Improve access to infrastructure (for example, devices, internet access) Develop tools/platforms to support unskilled people to get online
TECH COMPANIES	<ol style="list-style-type: none"> Provide curriculum and content potentially in partnership with government or private providers Directly provide training to develop talent pool 	<ol style="list-style-type: none"> Set standards in terms of certifications required for digital training Advise government on policy Provide teacher training and support government infrastructure initiatives
DONORS	<ol style="list-style-type: none"> Fund basic skills training Fund programs enabling skilling for marginalized and underrepresented groups Support the early expansion of innovative or untested models, including student financing 	<ol style="list-style-type: none"> Fund the development of improved digital skills content Support development and access to low cost devices
INVESTORS	<ol style="list-style-type: none"> Help scale and import effective training models Consider investment in student financing models that enable expansion of access 	<ol style="list-style-type: none"> Invest in infrastructure and telecommunication
LARGE EMPLOYERS	<ol style="list-style-type: none"> Directly provide training to develop talent pool Invest in digital skill programs as a part of corporate social responsibility 	<ol style="list-style-type: none"> Actively seek to partner with government or private operators to align curriculum to latest industry standards Invest in infrastructure development as a part of CSR

1. **African education providers that currently offer digital skills** may wish to expand to fully take advantage of the opportunity in the region. Proven business-to-consumer providers should look to the business-to-business and business-to-government opportunity, which has the potential for diversifying revenues. If the provider wants to support marginalized or underrepresented groups, it has a greater likelihood of impact-investing finance and donor or government support. Providers should recognize the need to align with employer needs and look to build programs that lead directly to jobs. Opportunities may arise to partner with local technology companies in new regions that can provide a pipeline of talent. This could help to ease challenges in expansion and provide capital, lowering reliance on student fees.

2. **African education providers that do not currently offer digital skills** should consider developing new course offerings in digital skills, with different levels and duration of courses. Existing vocational and higher education providers are well positioned to expand into

digital skills but should understand the need to move from theoretical to practical training approaches and to create shorter courses that lead to jobs. Institutions should ask prospective employers about the skills they need and the number of people to do them before embarking on program designs. They should enlist these employers to take on interns or to provide real-world project and training experiences for learners. Employees who are looking to sharpen their digital skills are one potential market, especially where employers may commit to providing a higher salary for those who pursue training. Providers should also consider how to integrate digital skills throughout their curriculum. Education providers without digital skills expertise should also consider acquiring them given that technical knowledge and industry insight will be an important driver of success in new digital skills programs.

3. **Digital skills providers outside of Sub-Saharan Africa seeking to enter the continent’s markets** should identify markets with a strong unmet demand for digital

skills and a reasonably high ease of doing business. Joint ventures with local technology or education companies would be a sensible route to market entry. Overseas providers should also consider important modifications to business models to accommodate local students, such as adjustments to course configuration to match student payback periods, adjustment of course timings or a mix of remote and in-person learning to match student preferences around pace and place of learning. Nonprofit providers also have opportunities to leverage donor and government funding to expand access to digital skills.

4. **Technology companies** have a role to play in supporting the development of the ecosystem and aligning public and private sector digital skills to the latest industry standards (as explored in the Opportunity Framework in figure 34). Microsoft4Africa illustrates how a technology company can help to directly expand the pool of technology talent through work experience and internships. They also can play a role as direct digital skills providers, through expansion of online courses and certification opportunities linked to their products. Microsoft and Google are examples of providers offering such courses.

The digital skills opportunity in Sub-Saharan Africa is significant, with potential for a variety of operators to enter the market and contribute to building the digital skills ecosystem.

CONCLUSION

The case studies illustrate a variety of contexts, approaches, skill levels, business models, and target students, but most share a common focus on market-oriented skills that are refreshed often to ensure their continued relevance. Nearly all programs are geared towards solving the supply-demand

gap in the labor market. The emphasis on employability is evident in the broader non-technical workplace readiness skills taught across all evaluated programs. Decision makers should keep this and the framework for business model viability in mind as they consider potential program configurations.

Stakeholders can select digital skills training models across several levels. Intermediate and advanced skills often are directly paid for by consumers in business-to-consumer models, but there are opportunities for third-party payers such as government, business, or donors. Certain business models are best suited for different program types. Good Things Foundation, for example, employs a nonprofit business model that is viable because it provides basic skills to some of the most vulnerable populations the public sector otherwise struggles to reach. At the other end of the spectrum, Udacity can charge its users for their courses because they focus on intermediate and advanced level studies that are highly market aligned.

The global digital skills survey reveals a gap in the supply of digital skills training and availability of digital skills. Markets across Sub-Saharan Africa are experiencing a shortfall in digital skills, which will continue to boost demand for digital skills training courses. The case studies offer proof of viable business opportunities for multiple organization types and show that private sector providers, including traditional educational providers, can find strong business opportunities in providing digital skills training. New providers also can learn from these best practices to improve their offerings and drive innovations in the use of technology for delivery, hybrid education and employment, and programs that blend placement firms with rapid training.

Looking Ahead

- Urgent action is required and the private sector must play a role in addressing the challenge in digital skills
- This challenge can be met through proven models with potential to scale and lessons to other innovative providers willing to make inroads in the space
- Digital skills must also be integrated throughout education, including at a foundational level in schools

This report explored how technological shifts are changing requirements for jobs and skills, with a focus on Sub-Saharan Africa and Ghana.

Sub-Saharan Africa has been underrepresented in the global discourse on digital skills but, as this research shows, its need and demand for digital skills is significant. This research prompts several key observations as decision makers look to the future of digital skills in the region.

First, urgent action is required to address the challenge in digital skills and the private sector must play a role. The nature of work is changing—from the way employees complete basic office tasks to how builders construct cities—and this research on digital skills further emphasizes that shift.

More change is certain, but its contours, magnitude, and consequences are not yet fully understood.

What is clear, however, is that investments in human capital can help economies to weather these transitions and to ensure their competitiveness in the future. Action is needed to help people gain digital skills. The gap in supply and

demand of key skills is likely to persist without intervention, which could threaten the economies of countries that fall behind and, with them, the aspirations of millions of people.

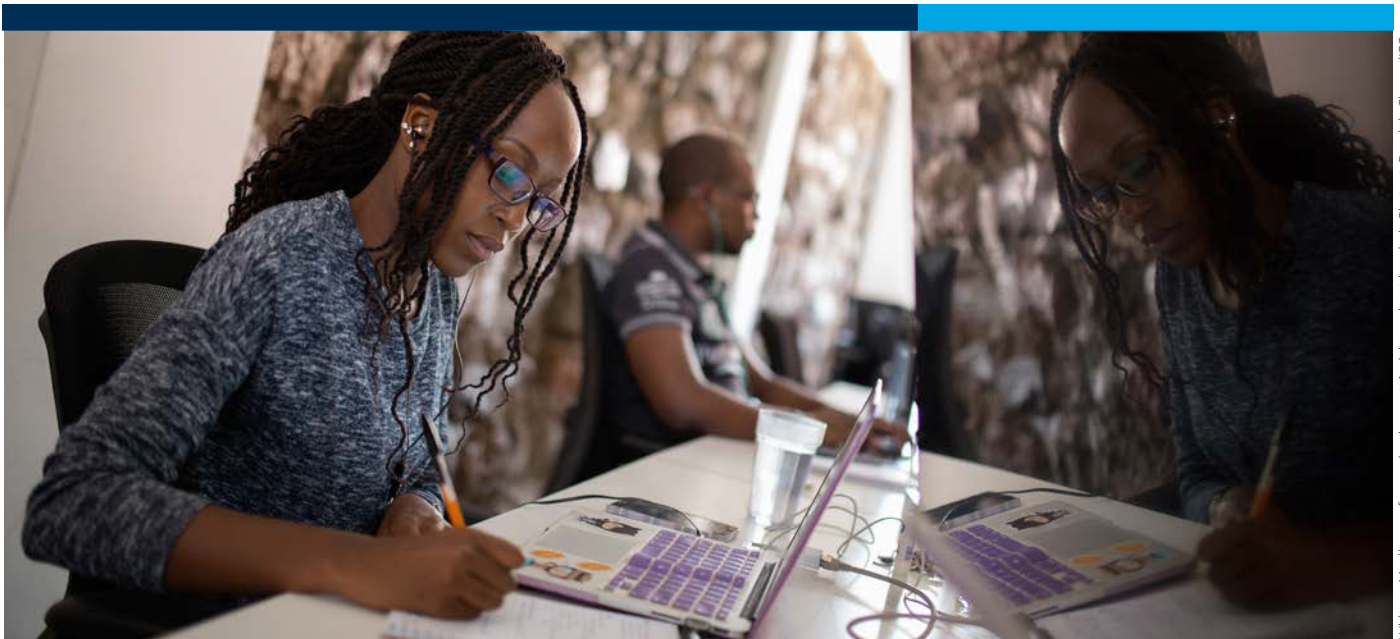
Governments, donors, investors, businesses, and education providers should prioritize models for education that help people gain and sustain these skills and behaviors so essential to the future of work. Much of education financing focuses on access, with some investments in quality and relevance. Innovative models that enhance twenty-first century skills are still outside the mainstream in many countries, particularly emerging markets. New models for imparting and measuring these skills are urgently required. Leaders in education must therefore focus on expanding their offerings surrounding digital skills.

The market opportunity for private sector education is massive. This report highlights significant unmet demand for digital skills. That demand will continue to grow over the coming decade. Private sector providers can find opportunity in intermediate and advanced skills areas with market potential of roughly \$130 billion. Ghana alone will offer an estimated \$3.7 billion through 2030.

In expanding these offerings, private providers will be able to both profit and help shape the competitiveness of Sub-Saharan Africa and the life chances of its people.

Second, this challenge is addressable through proven models that can be replicated and scaled. The report examined eight case studies in depth and profiled many more in brief. Researchers drew these examples from more than 160 projects globally, many of which are operating in emerging markets.

These are successful and proven models for learning digital skills, both in Sub-Saharan Africa and beyond, with potential to offer lessons for providers aiming to enter the market. Our examples include business-to-business models that governments and donors can support to help spread



Whitney Manjiru a software developer at Andela works at her desk. Photo © Dominic Chavez/IFC

foundational digital skills, as well as business-to-consumer options for advanced and intermediate programs that rely on graduates' employability to drive growth. Some programs already are leveraging online tools, partner networks, and platforms that can help drive scale and reach thousands more participants. Many programs in this study are seeking investment or opportunities to partner and grow.

A consortium of providers and investors are needed to support models that have strong potential for impact and scalability—those that can go from 100 students to 10,000 and eventually to 100,000.

Along with profit-seeking investment, donor and government funding will prove essential to developing business models that serve the bottom of the pyramid and extend intermediate and advanced skills to a wider population. The business community, particularly the technology sector, also can be an effective partner in developing and expanding solutions.

Finally, foundational skills taught in school must include basic digital skills. Most survey respondents believe school is the appropriate level to learn basic skills. But many market participants consulted for the study noted that digital skills were not taught sufficiently in schools.

Digital skills are now considered foundational, as essential for the future of work as reading and writing. This study underscores the importance of very human twenty-first century skills such as critical thinking, communication,

problem-solving, leadership, collaboration, creativity, decision-making, and team work. These are consistently cited in the literature and in the primary research undertaken for this study as the key skills for the future workforce. These are skills that cannot be replicated by machines and that will ensure human beings are adaptable and capable of transformation in a digitally-enabled future. It is essential that education systems align curricula to deliver the twenty-first century socio-behavioral skills invaluable to the rapidly-changing future of work.

While the private sector can play a role, the appropriate stewards to meet this challenge are public sector education systems. They are equipping this new digital generation and investing in their countries' human capital. Access to high-quality digital skills training in Sub-Saharan Africa is predicated on access to core education. Ongoing investments to improve education quality, access, and relevance remain important.

The digital skills challenge in Sub-Saharan Africa is significant, but it is not insurmountable. Ghana reveals this potential, particularly for the private sector. Whether Ghana and other Sub-Saharan African countries can take advantage of the digital opportunity to become more competitive and prosperous will depend on whether their human capital keeps up with this workforce transformation. Digital skills are an essential part of that human capital development and paramount to future success.

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Appendix A: Research and Methodology

GLOBAL DIGITAL SKILLS SURVEY

The global digital skills survey explored perspectives and trends for digital skills around the world, but especially in Sub-Saharan Africa and Ghana. The survey took place between October and November 2018.

It was distributed by email to more than 1,000 individuals. There were 152 respondents. Nearly 60 percent of all survey respondents were based in Sub-Saharan Africa, and 30 percent of all survey respondents were based in Ghana. More than half of the survey participants were from private for-profit organizations. Participants included entrepreneurs, investors, individuals from nongovernmental organizations, and social enterprises (see figure 35). The remainder comprised a mix of corporations, technology companies, donors, and foundations with a focus on the education sector. Roughly 90 percent of respondents work at

organizations that hire employees with digital skills, while 75 percent work at organizations that provide digital skills training.

Respondents were requested to provide survey input for the regions in which they had expertise. For the purpose of survey analysis, respondents were categorized by geography as follows (see figure 36).

The survey relied on rankings to understand the importance of various skills required by the workforce, in addition to a series of questions to help assess the degree of the demand-supply gap.

The methodology for weighing and analyzing ranking questions was as follows (see figure 37):

The method for weighing and analyzing the demand-supply gap index questions is described in figure 38:

Figure 35: Respondent Profile

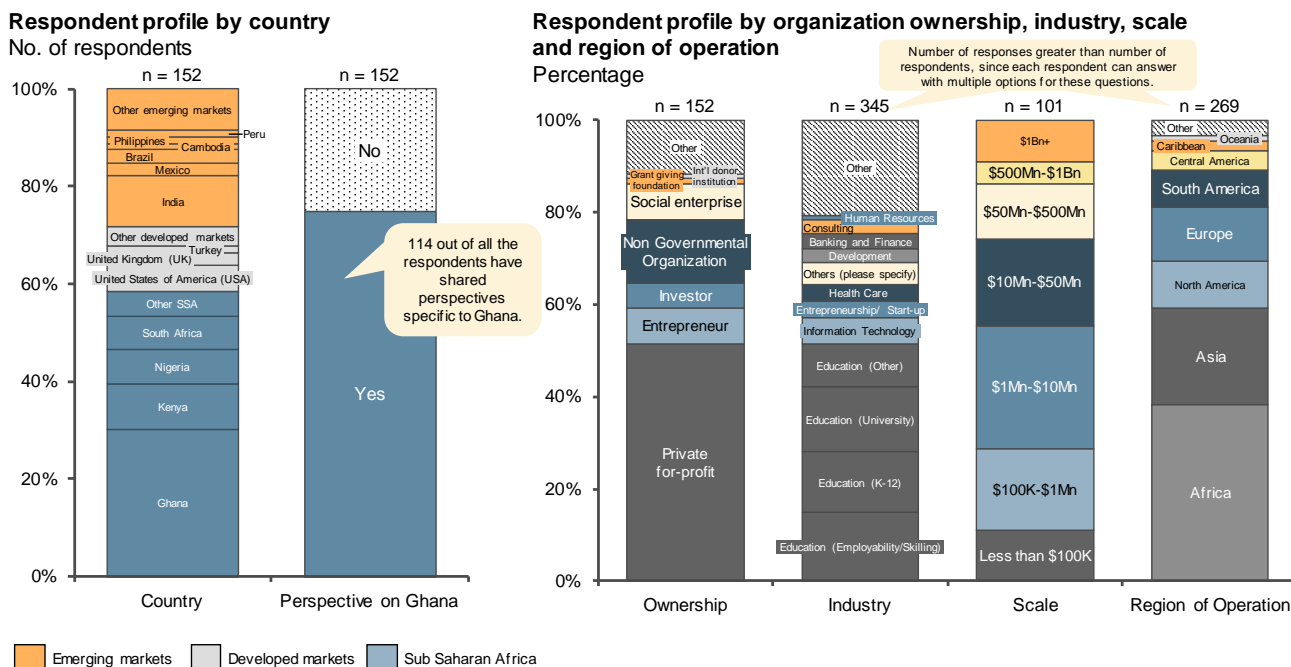


Figure 36: Geographic Scope of Respondents

Terminology	Geographic background of respondent	Geography under discussion	No. of respondents
All Markets	All respondents	Global Markets + Sub-Saharan Africa + Ghana (responses aggregated)	152
Global Markets +	All respondents	Global Markets	114
Global Markets -	All respondents excluding respondents who are based in Sub-Saharan Africa	Global Markets	63
Sub Saharan Africa +	All respondents	Sub-Saharan Africa	79
Sub Saharan Africa -	Respondents based in Sub-Saharan Africa only	Sub-Saharan Africa	43
Ghana +	All respondents	Ghana	69
Ghana-	Respondents based in Ghana only	Ghana	46

Figure 37: Methodology for Weighing and Analyzing Ranking Questions

<i>Responses where Skill X is chosen (Question: Rank the list of skills in order of significance for the workforce of the future)</i>					
Rank	1	2	3	4	5
Weight	5	4	3	2	1
No. of mentions	a	b	c	d	e
Weighted mentions	$5a + 4b + 3c + 2d + 1e$				

Figure 38: Methodology for Weighing and Analyzing Demand-Supply Gap Index

<i>Responses for Skill X (Question: Comment on the market supply and demand for the skills you ranked as most important)</i>						
Demand-supply comparison	Supply significantly exceeds demand	Supply moderately exceeds demand	Supply demand are balanced	Demand moderately exceeds supply	Demand significantly exceeds supply	Not Aware
Weight assumed for demand-supply gap calc.	-2	-1	0	1	2	0
No. of mentions	a	b	c	d	e	f
Demand supply gap index	$\frac{(2e + 1d + 0c - 1b - 2a)}{(a + b + c + d + e)}$					

The survey questionnaire was as follows:

1. Which country are you based in?
2. What type of organization do you work for?
3. Does your organization offer education services?
4. What type of educational services does your organization offer? (Please select all that apply)
5. Does your organization offer digital skills training?
6. Does your organization hire individuals requiring digital skills?
7. How many people does your company recruit every year? Of these, what percentage are recruited for roles requiring digital skills (if applicable)? *(in response participants indicated the percentage of recruits who would require at least the stated level of skills at the least, e.g. percent requiring basic functional skills at the least)*
8. How do you recruit for roles requiring digital skills? What is the reason for recruiting internationally for roles requiring digital skills?
9. Based on your knowledge and experience, please rank the following skills and characteristics in order of significance needed in the workforce of the future in Global Markets, Sub-Saharan Africa and Ghana. How does this vary for Global Markets vs Ghana vs Sub-Saharan Africa? (Please rank top 5 choices where 1 represents 1st most significant and 5 represents 5th most significant. Please only fill out for geographies with which you are familiar)
10. Please comment on the supply of skilled labor and the demand for skilled labor for the skills you rated as most important.
11. In your experience, what proportion of jobs require some digital skills across various markets? How has this evolved over the last 3 years? What is the outlook for jobs requiring digital skills over the next 10 years?
12. Based on your knowledge and experience, please rank the following digital skills in order of significance for the future workforce in Ghana, Sub-Saharan Africa and Global Markets
(Please rank top 5 choices where 1 represents 1st most significant and 5 represents 5th most significant. Please only fill out for geographies with which you are familiar)
13. Please comment on the supply of skilled labor and the demand for skilled labor for the digital skills you rated as most important
14. In your experience, if we were to assess the demand-supply landscape for digital skills in terms of experience, is there a gap for each of the following seniority levels?
15. What do you think are the 3 key challenges faced by companies while recruiting talent for digital skills?
16. What are the key reasons behind any demand supply gap in digital skills in Sub-Saharan Africa/Ghana?
17. If you believe there is a demand-supply gap in digital skills, what can be done to address this?
18. In your view, at which stage of education is it ideal to learn the different levels of digital skills?
19. In your opinion, what can each of the following stakeholders do differently to help solve the demand supply gap in digital skills:
20. In what industry does your organization specialize? (Please select all that apply)
21. How many people work for your organization?
22. What is the scale of your organization in terms of revenue (USD)?
23. Which regions is your organization active in?
24. Please fill in the following information for your institution's digital courses:
25. Would you like to get access to a private set of findings from this survey?
26. Would you be willing to participate in a short interview to supplement these survey findings and support

developing this IFC report?

MARKET SIZING

Market sizing was conducted to determine future demand for digital skills training in Sub-Saharan Africa and Ghana. The exercise is explained in Chapter 3 and detailed findings regarding the drivers of demand for digital skills are in Appendix B. The results were determined based on the following approach:

Understanding Demand for Digital Skills Based on Key Drivers

1. **Size, shape and growth of economy:** Ghana's gross domestic product forecast for 2030 by each key sector in the economy was estimated based on projections from the International Monetary Fund, Oxford Economics, and industry participant discussions. The three key sectors identified were agriculture, industry, and services.
2. **Labor force requirement by sector for 2030:** Ghana's 2030 labor force requirement for each sector was estimated based on the anticipated GDP growth by sector and historic trends in labor force productivity growth. Data was drawn from the IMF, Oxford Economics, Euromonitor, and industry participant discussions.
3. **Informal and formal sector size:** The sizing factored in the growth of the informal sector with forecasts through 2030. This was based on trends in the share of the informal versus the formal sector in Ghana and the greater Sub-Saharan region. Data was drawn from Ghana Statistical Services and ILO.
4. **Digital skills workforce anticipated for 2030 across key sectors:** The study estimated current requirements of digital skills and anticipated change in digital skills requirements across three key sectors. This exercise was conducted for both the informal and formal sectors. The estimate of current and expected digital skills requirements in the informal sector drew from discussions with employers and industry participants across multiple sectors, in addition to projections of likely Internet

penetration in Ghana based on UNESCO statistics.

Internet usage is a prerequisite for growth of many digital skills, particularly intermediate and advanced digital skills that make use of Internet search, cloud computing, and social media platforms. The estimate of the current and expected digital skills requirement in the formal sector drew from discussions with employers across multiple sectors and the results of the global digital skills survey.

5. **Number of jobs requiring digital skills in 2030 by sector:** The model determined the anticipated number of jobs requiring digital skills in agriculture, industry, and services by 2030 in the informal and formal sectors. It was based on the anticipated informal and formal sector size, and expected digital skills workforce need across key fields. The expected number of jobs requiring digital skills was estimated by skill level (basic, intermediate and advanced).

Opportunity Size Calculation

6. **Training opportunity size:** The study used the forecasted number of jobs requiring digital skills in 2030 by sector to estimate digital skills training opportunity over the next decade. Digital skills training refers to the ability to teach the new labor force digital skills and renew digital skills for the existing workforce every four to five years.
7. **Business-to-consumer opportunity versus business-to-business and business-to-government opportunity:** Basic digital skills, increasingly considered a part of foundational and basic education, present a limited self-pay opportunity. For this reason, the business-to-consumer opportunity forecasted comprises intermediate and advanced skills. The business-to-business and business-to-government opportunities are estimated across all digital skill levels (basic, intermediate, and advanced).

8. **Affordability:** Some 10 percent of household spending in Ghana is on education, and it is assumed that 50 percent of this, or 5 percent of total household income, could be spent on digital skills for business-to-consumer services.
9. **Price of training:** The price of training was estimated by studying 85 digital skills courses in Ghana and determining the average price across various skill levels.

Figure 39: Outline of Market Sizing Exercise

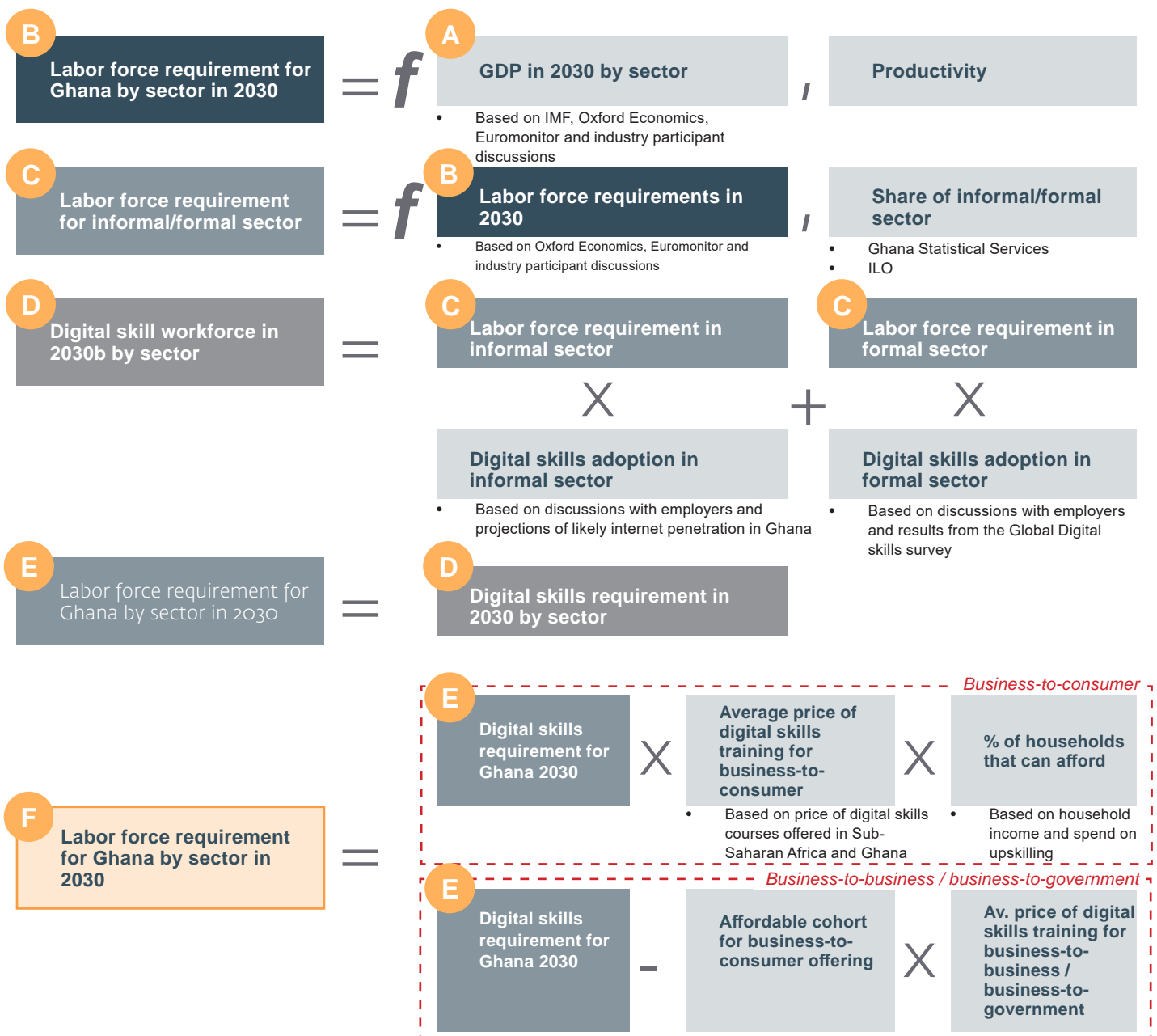




Table 2: Interviewees based in Ghana that took part in the market sizing:

Designation	Sector	
Agriculture Officer	Agriculture (public sector)	
Operations and Planning Manager	Agriculture	
Executive Director	Agriculture	
(Cattle) Expert	Agriculture	
Field Expert	Agriculture	
HR Manager	Aviation	
Engineering Assistant	Construction	
HR Manager	Construction	
HR Officer	Construction	
Director	Education	
Dean	Education	
HR Manager	Financial	
HR Professional	Hotels	
HR Manager	Hotels	
HR Manager	Information and Communication	
HR Manager	Information and Communication	
Head of Retail Operations	Retail	
Store Manager	Retail	
Administrative Manager	Retail	
HR and Social Media Executive	Recruitment Services	



Table 3: Resources used for the market sizing activities

GDP	<ul style="list-style-type: none"> • Ghana Statistical Services • IMF • Oxford Economics • Euromonitor • African Development Bank Group's outlook on Ghana's economy
Labor Force/ Productivity	<ul style="list-style-type: none"> • Ghana Statistical Services • Oxford Economics
Formal versus Informal Economy	<ul style="list-style-type: none"> • Labor Force Report, Ghana Statistical Service, 2015 • National Employment Report, Ghana Statistical Service, 2014 • Regional Spatial Business Report, Ghana Statistical Service, 2016 • Ghana Living Standards Survey Labor Force Report, Ghana Stats, 2014 • Informal Sector in Ghana, Report by Friedrich Ebert Stiftung, 2011 • Informal Economy in Africa, International Labor Force Report, 2009
Adoption of Digital Skills	<ul style="list-style-type: none"> • Middle-Skill Workers and Careers, Burning Glass Report, 2017 • Digitalization and the American Workforce, Brookings Report, 2017 • Employment Projections, US Bureau of Labor Statistics • Internet Penetration in Ghana Statistics, Oxford Economics • Youth, ICTs and Agriculture, ICT4D, 2013 • Discussions with 20 employers in Ghana from the three major sectors of the economy (agriculture, industry and services) • The following sources were consulted to study the impact of automation on the Ghanaian economy. There are no robust estimates identified for the impact of automation on the Ghanaian economy. <ul style="list-style-type: none"> – The Changing Nature of Work, World Development Report – Future of Skills, Employment in 2030, NESTA, 2017 – Automation, Employment and Productivity, McKinsey Report, 2017

CASE STUDIES

Program Selection

Study researchers first developed a list of 162 programs for potential profiling. This was followed by an eligibility check of the program's skill focus, scale, exposure, and status. This cut the list to 56 programs. Researchers then examined each program's employment focus, innovation, diversity, and success. This resulted in a shortlist of about 20 programs. Study authors chose the final eight case studies based on the fit for this report and a variety in the program's skill level, geography of coverage, typical learning profile, scale, stage of development, and business model.

Case Study Development

Case studies were developed in collaboration with the profiled organization between October-November 2018. Information was gathered through interviews with the organization, its students and alumni, and secondary desktop research. All information that is contained in the case studies has been vetted by the profiled organizations.

Some of the selected organizations offer multiple programs. The following programs provided differing program approaches so were selected for review:

1. The Andela case study focuses on the organization's Andela Fellowship program
2. The 4Afrika case study focuses on the Interns4Afrika and AppFactory programs
3. The Udacity case study focuses on the Nanodegree programs
4. The Good Things Foundation case study focuses on the Future Digital Inclusion program

Appendix B: Drivers of Demand for Digital Skills

SIZE, SHAPE, AND GROWTH OF THE ECONOMY (see figure 40)

Ghana's economic growth fell from 14 percent in 2011 at the onset of oil production to 3.5 percent in 2016, the lowest in two decades. The country's economy is estimated to have expanded by 8.5 percent in 2018 driven by the mining and oil sectors and new hydrocarbon wells.¹⁶⁵

Economists predict stable growth over the next five to 10 years and Ghana's gross domestic product is expected to grow at 5 percent annually from 2018, reaching \$55 billion by 2030. Ghana's economy received a vote of confidence in

September 2018 when ratings agency Standard & Poor's upgraded the country's credit score from B- to B with a stable outlook. The International Monetary Fund expects GDP to expand by 6.3 percent in 2018 and 7.6 percent in 2019, before settling at a steadier 5 percent or higher for most of the coming four years.¹⁶⁶

Ghana's economy is split between agriculture (19 percent), industry (38 percent), and services (37 percent). The contribution of each sector to the economy is likely to remain relatively stable until 2030.

Figure 40: GDP for Ghana, by Sector, 2015-2030

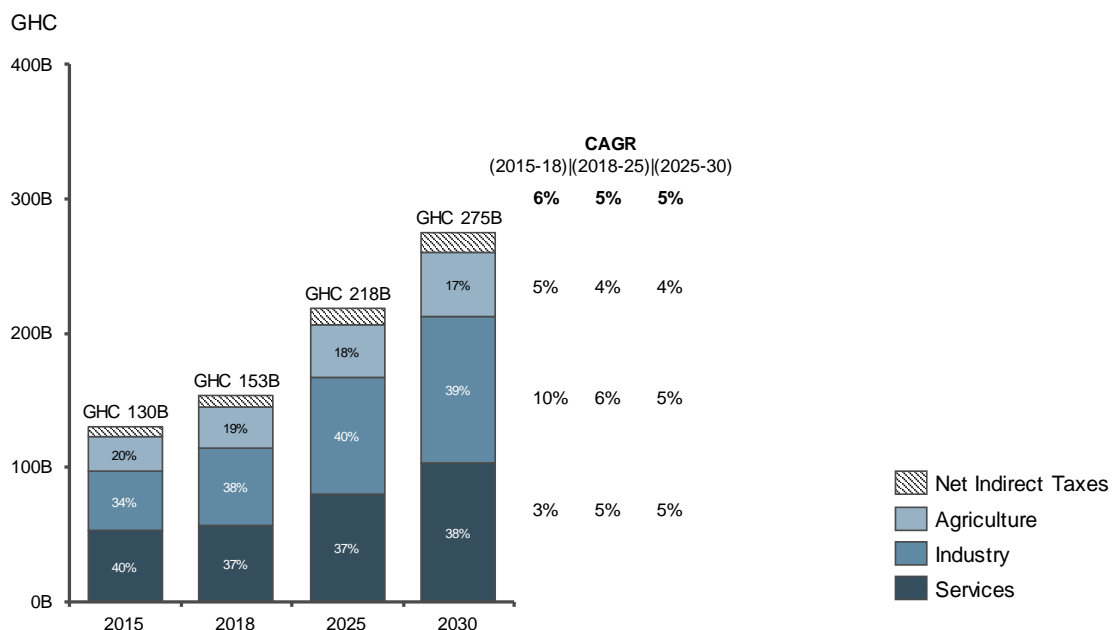
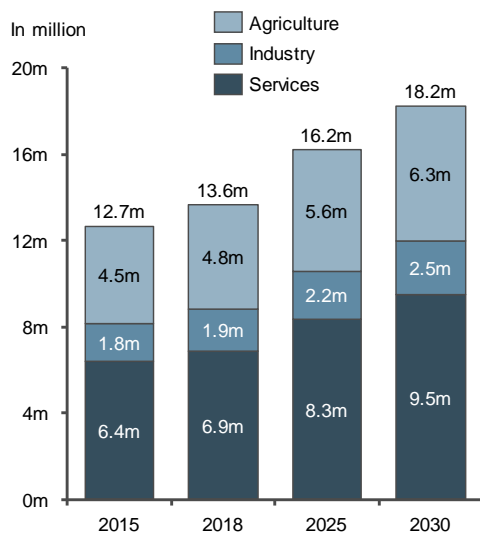


Figure 41: Labor Force in Ghana, Informal Versus Formal Sector, 2015-2030



PERSISTENT INFORMALITY (see figure 41)

The informal economy is the part of the economy that is neither taxed nor regulated. A large number of Ghanaians work in unofficial jobs, about 80 percent to 96 percent of total employment.¹⁶⁷ This is variable across sectors of the economy, with agriculture close to 90 percent informality, and services and industry at roughly 80 percent.

The formal sector has grown marginally faster than the informal sector and is projected to continue to grow more quickly through 2030. The Ghanaian government is seeking to move informal sector activity into the formal economy through a combination of activities including introduction of a global positioning system and a tax identification number.¹⁶⁸ The size of the informal sector is expected to shrink as these government initiatives result in more informal sector businesses coming under the formal sector. But Ghanaians are not likely to see a swift reduction in size given historic global trends in informality.¹⁶⁹ The frontiers between the digital economy and the informal sector will continue to become blurrier, which could result in shifts in

informality (for example, as mobile payments bring more informal businesses into formal tax regimes).

Researchers expect informality will reduce somewhat by 2030 in the agricultural sector to about 80 percent, and in industry and services to 70 percent.

FUTURE LABOR FORCE REQUIREMENTS (see figure 42)

Nearly 7 million people work in the services sector in Ghana, nearly 5 million in agriculture and close to 2 million in industry. Productivity in Ghana is expected to continue along the same trajectory as it has over the past three years, increasing by \$59 per person. That will increase Ghana's future labor force to more than 9.5 million service jobs, more than 6 million in agriculture and 2.5 million in industry.

INTERNET PENETRATION (see figure 43)

Thirty-eight percent of Ghanaians have access to the Internet, growing at about 2 percent a year. Internet penetration is expected to increase to 58 percent by 2030, slightly higher than the current global level for Internet penetration. Internet usage is a prerequisite for growth of many digital skills, particularly intermediate and advanced digital skills that make use of Internet search, cloud computing, and social media platforms.

REQUIREMENTS FOR DIGITAL SKILLS

Requirements for digital skills, or adoption rates, vary by sector of the economy and informal or formal jobs. Each subsector will have variable demand for digital skills, depending on job function and requirements for use of technology. Informal sector farmers, for example, may have higher levels of digital skill requirements than initially obvious because they require information about markets,

crops, and the weather. This makes them more likely to use the Internet and access basic digital tools than some other professions, such as construction workers.

Informal sector requirements for digital skills are expected to be lower than in the formal sector. "In Ghana, the demand for training by informal businesses is low because most managers do not see lack of skills as a constraint,"¹⁷⁰ according to the 2019 World Development Report. Informal sector requirements also are expected to be lower than the formal sector because, as another industry observer said, "These are very small businesses, with few people to manage, so they are reluctant to adopt new technology."¹⁷¹

It is important to note that digital skill adoption rates are notoriously difficult to estimate. The estimates provided here are based on interviews with 20 hiring managers and market participants in Ghana who are deeply embedded in their industry subsectors and who were able to talk about job roles and their likely requirements for digital skills.

Figure 42: Labor Force Requirements in Ghana, by Sector, 2015-2030

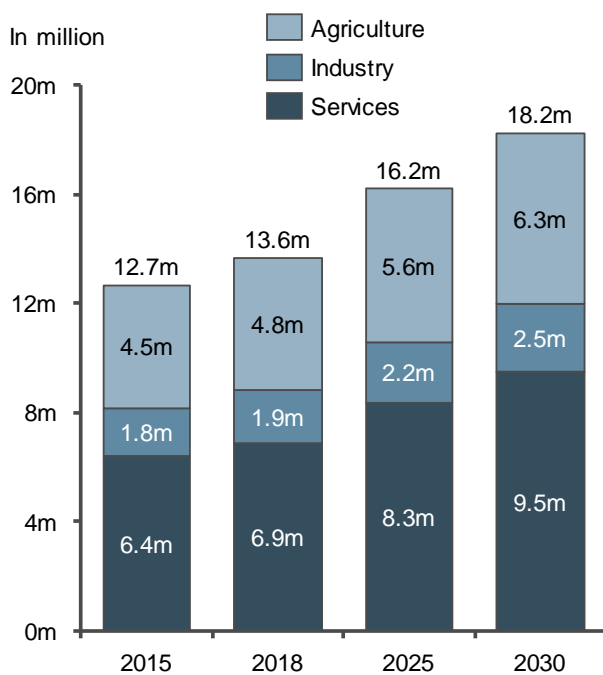
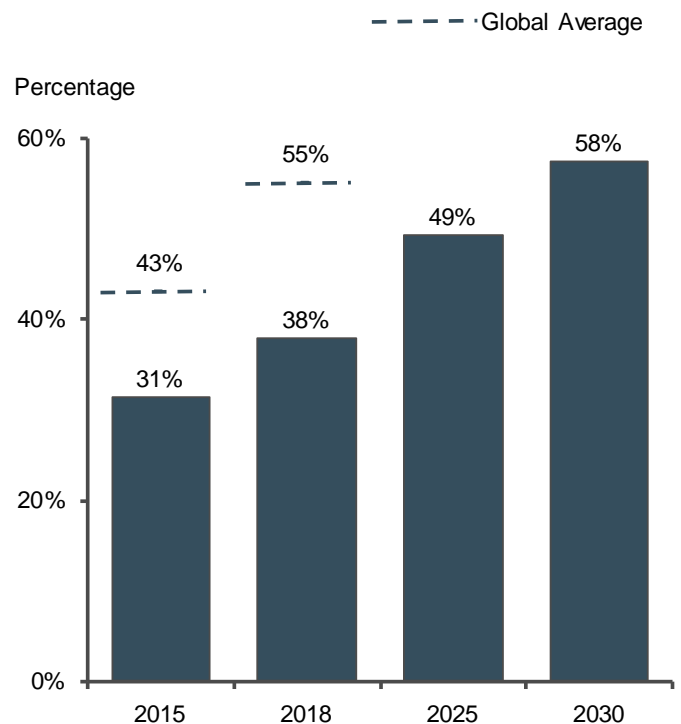


Figure 43: Internet Penetration in Ghana, 2015-2030



AGRICULTURE (see figure 44)

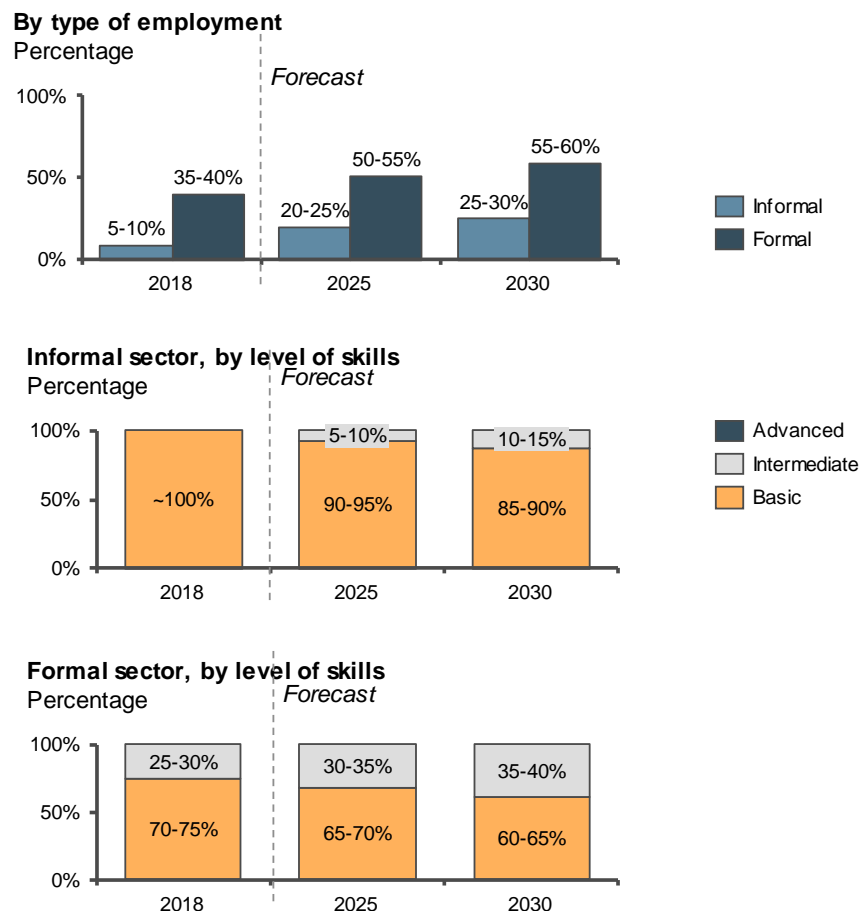
Digital skills are seen by industry participants as important to the future of the agricultural sector. "The outlook for jobs requiring digital skills will increase significantly over the next decade, owing to policy reforms in Ghana that promote the adoption of ICT applications and precision agriculture technologies for increased agriculture production," one participant said.¹⁷² The demand for digital skills in agriculture is expected to grow from 5 percent to 10 percent in the informal sector to between 25 percent and 30 percent by 2030 and in the formal sector from between 35 percent and 40 percent to between 55 percent and 60 percent.

Digital technology allows agricultural workers to get better information, including from the government, which can improve agricultural productivity. "Agriculture is developing

with help from the government and farmers will soon have money for smartphones and mobile data," an industry participant said. "Some of them already use smartphones, typically for weather reports or alerts from the government. Many go on YouTube to watch videos specific to their subject or do quick Google searches and interact in WhatsApp groups for information about agriculture."¹⁷³ In Kenya, researchers have observed this type of technology in a pilot. The International Institute for Communication and Development program in western Kenya has set up five farmer information and communication technology hubs, which drastically increased productivity. Now 90 percent of farmers use technology for business.¹⁷⁴

A second likely driver of digital skills among farmers is financial services, through what one researcher described as a mobile "economic identity that ties a mobile phone

Figure 44: Requirements for Digital Skills in Agriculture, 2018-2030



number to a farm's location, size, and crop type.¹⁷⁵

Researchers expect about 90 percent of informal sector demand in 2030 to be in basic skills, with a need for around 10 percent of digitally-skilled employees to have intermediate digital skills. The informal agriculture sector is likely to use basic skills because, as one participant said, "the agriculture industry is dominated by small-scale organizations comprising of five or six people. They do not require any software or advanced skills, and their digital skill requirements are basic in nature."¹⁷⁶ Financial and information services also are likely to require only basic digital skills.

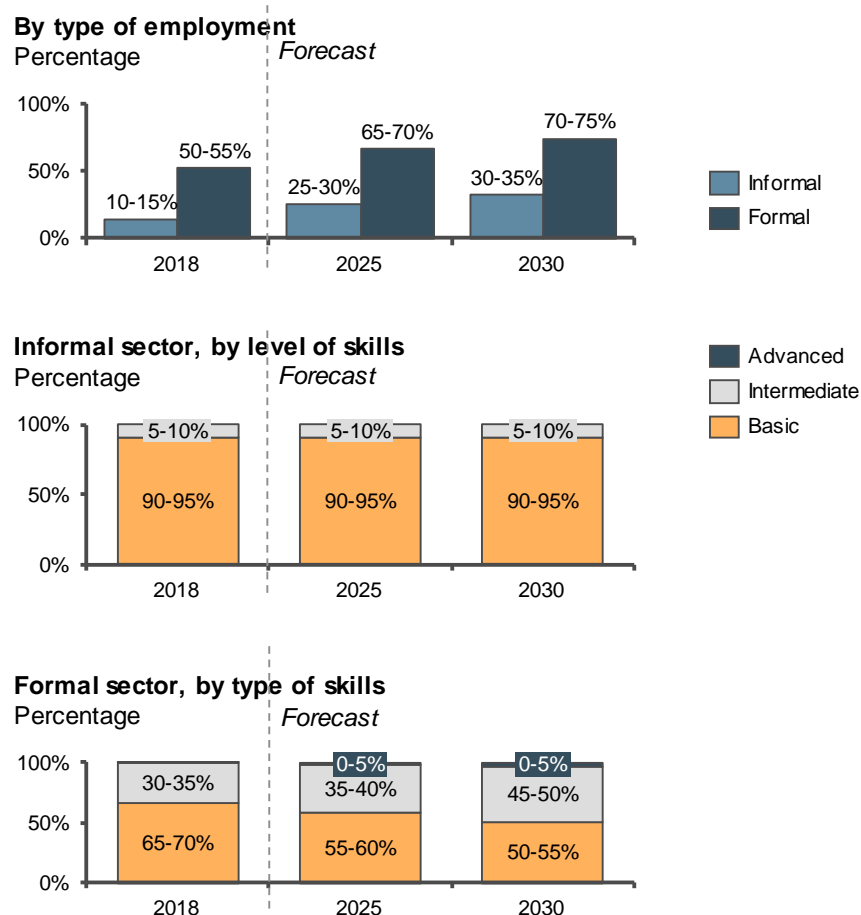
In the formal agricultural sector, 60 percent to 65 percent of digitally-skilled employees are expected to require basic digital skills by 2030 and 35 percent to 40 percent will require intermediate skills. Industry participants see a

growing demand for graduates with leadership and technical skills, especially in management positions. "Even though most digital skills required are basic, like using apps for communication, weather forecast and information exchange, management jobs require the use of intermediate skills like project management software, report writing, and creating profit statements," one participant said.¹⁷⁷

INDUSTRY (see figure 45)

The demand for digital skills in industry is expected to grow from between 10 percent to 15 percent of informal jobs to between 30 percent and 35 percent by 2030. Formal sector jobs requiring digital skills will rise from between 50 percent and 55 percent to between 70 percent and 75 percent. Industry refers to sub segments including manufacturing, mining, and construction, all of which have a heavy reliance

Figure 45: Requirements for Digital Skills in Industry, 2018-2030



on blue-collar work. Demand for digital skills likely will increase because “improved Internet is expected to digitize and make all data and information available online,” an industry observer said. “And better technology is expected to mitigate some of the dangers of physical jobs.”¹⁷⁸

Since blue-collar workers form a large majority of the industrial workforce, basic digital skills are expected to be in demand, both in the informal sector and the formal sector.

An estimated 90 percent to 95 percent of digitally-skilled informal sector workers are likely to require basic digital skills with just 5 percent to 10 percent requiring intermediate skills.¹⁷⁹ In the formal sector, researchers expect 50 percent to 55 percent of digital skills demand will be basic, 45 percent to 50 percent intermediate, and less than 5 percent advanced. “The level of digital skills typically observed in blue collar employees is fairly basic,” an industry participant said. “They sometimes go through simple YouTube videos on how

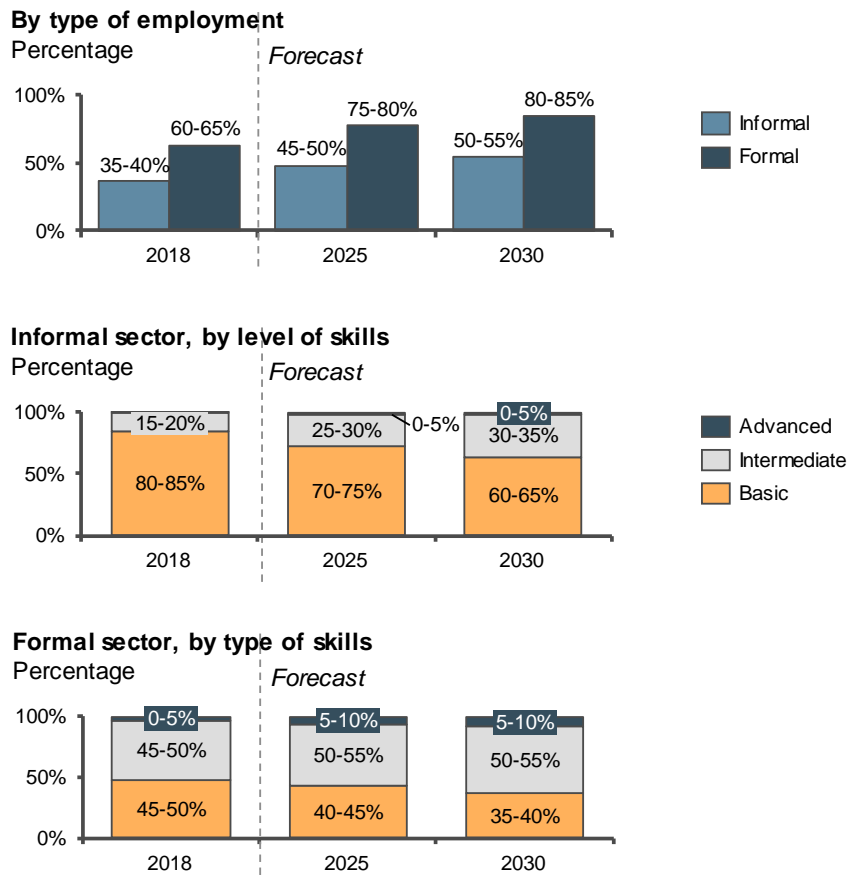
to repair something. They also communicate status of their work by sharing pictures on smartphone apps like WhatsApp.”¹⁸⁰

SERVICES (see figure 46)

The services industry has the highest anticipated levels of digital skills requirements. As one market participant noted, “Digital skills is the future of [the] retail and trade sector.”¹⁸¹ Services are expected to climb 80 percent to 85 percent within the formal sector jobs by 2030, up from 60 percent to 65 percent, and 50 percent to 55 percent in the informal jobs market, up from 35 percent to 40 percent. “There is a rise in companies which are adopting digital skills, underpinned by increased efficiency and optimization of work,” a market participant said.¹⁸²

An influx of investor and organizations have helped support the growth in digital skills requirements and contributed to

Figure 46: Requirements for Digital Skills in Services, 2018-2030



"improving the affordability of digital resources."¹⁸³ The Ghanaian government also is showing an active interest in integrating digital skills with mainstream education. And consumer behavior is changing as people start to realize the impact of digital skills in everyday activities. "Technology is enabling people to place online orders, get information about products simply by scanning barcodes, and leverage online financial services for their day to day bill payments,"¹⁸⁴ a participant said. Changes in customer demand and behavior drive market competition, from expectations that hotels will have websites to desires for easier shopping and faster parcel delivery.

There is strong demand for basic skills in the informal sector, with around 60 percent to 65 percent of digitally-skilled jobs expected to require basic skills and 30 percent to 35 percent intermediate, with less than 5 percent in advanced skills. The opportunity for managerial roles in small and medium-sized companies also will drive demand for intermediate skills in the informal sector. This is fueled by an increase in the adoption of Microsoft Excel and accounting software, as well as a rise in social media and a new focus on digital and social media marketing. The larger labor force, which comprises the majority of the informal sector, is expected to gradually adopt basic digital skills such as using smartphones to exchange messages, conduct basic web research and share photographs for updating supervisors.¹⁸⁵ Another example of this likely demand is from drivers in the transport industry. "Drivers form a large part of the informal sector in the transportation industry, and you wouldn't expect them to have anything to do with digital skills," a participant said. "However, with the entry of companies like Uber, and advancement in apps like Google Maps, many of them are increasingly leveraging mobile technology in their jobs."¹⁸⁶

In the formal sector, there is higher demand for digitally-skilled labor with intermediate digital skills estimated at 50 percent to 55 percent. Basic skills requirements are expected to reach 35 percent to 40 percent, with advanced skills at 5 percent to 10 percent. The drivers of demand in the formal sector include shifts in industry standards. One airline company recruiter noted, "Because of industry standards, we need to organize regular training programs for our

employees. We make sure our programs are aligned to meet the global standards in digital skills."¹⁸⁷

Formal sector jobs in services are more likely to require a majority of employees to have at least basic digital skills. "Services, particularly in the formal sector, require a large proportion of employees to be equipped with at least basic skills like exchanging emails, and using professional software like Microsoft Word and Excel," the head of human resources for a major bank in Ghana said.¹⁸⁸ This move away from paperwork and simple computer literacy is reflected in a growing demand for intermediate and advanced digital skills, expanding into the use of niche professional software.¹⁸⁹ This is reshaping another service sector, education, from user experience to operations. "Technology is changing a lot of things," one education leader said. "Lectures are getting digitized; tuition fees can be automated... but the senior management also needs knowledge of advanced skills."¹⁹⁰

SUMMARY OF REQUIREMENTS FOR DIGITAL SKILLS (see figure 47)

The study found that the overall requirement for digital skills, assuming a workforce of more than 20 million Ghanaians, is expected to reach 50 percent by 2030. This will comprise a 75 percent to 80 percent usage rate in the formal sector and 45 percent to 50 percent in the informal sector.

Human resource managers and other industry participants in Ghana agreed with digital skills survey respondents in the formal sector, who estimated 75 percent to 80 percent of laborers would require digital skills.¹⁹¹

TOTAL ADDRESSABLE MARKET FOR DIGITAL SKILLS IN GHANA BY 2030

The study estimated digital skill requirements through 2030 based on modeling of GDP growth, productivity, labor force requirements, technology penetration, and assumptions on digital skills adoption. The full methodology is available in Appendix A.

Figure 47: Requirements for Digital Skills in Ghana, 2018 - 2030

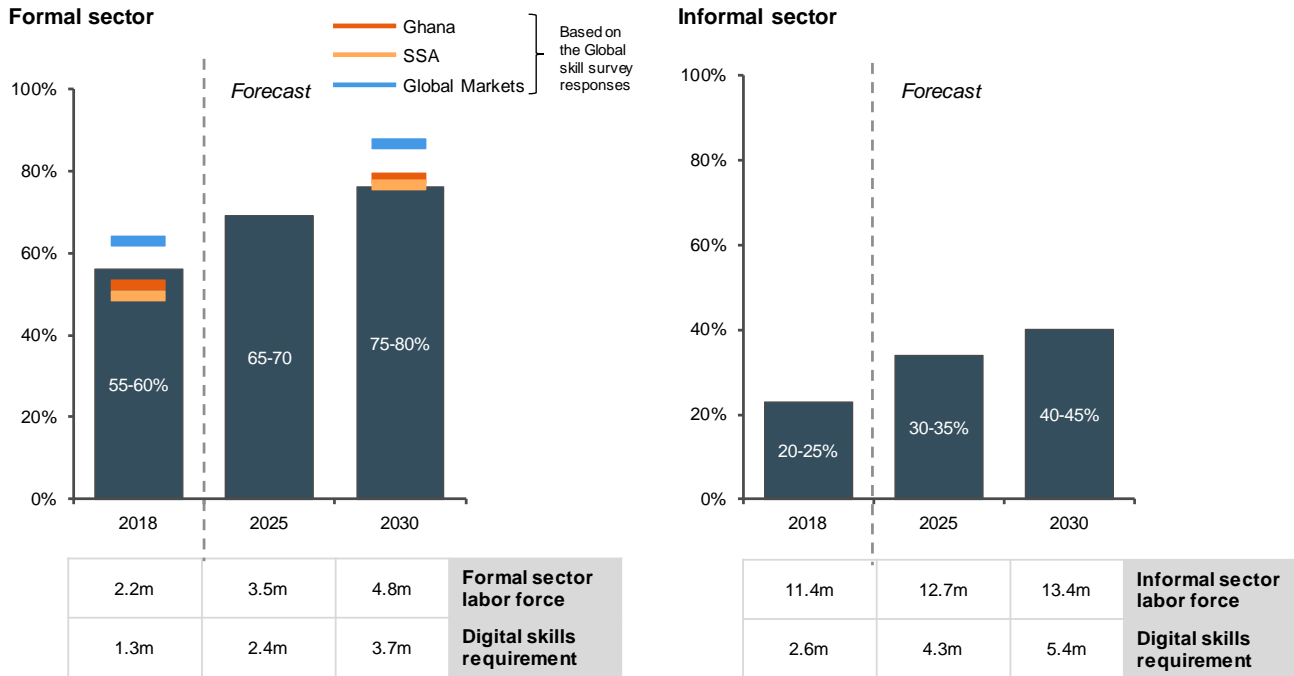


Figure 48: Digital skills requirement in Ghana by sector, 2018-2030

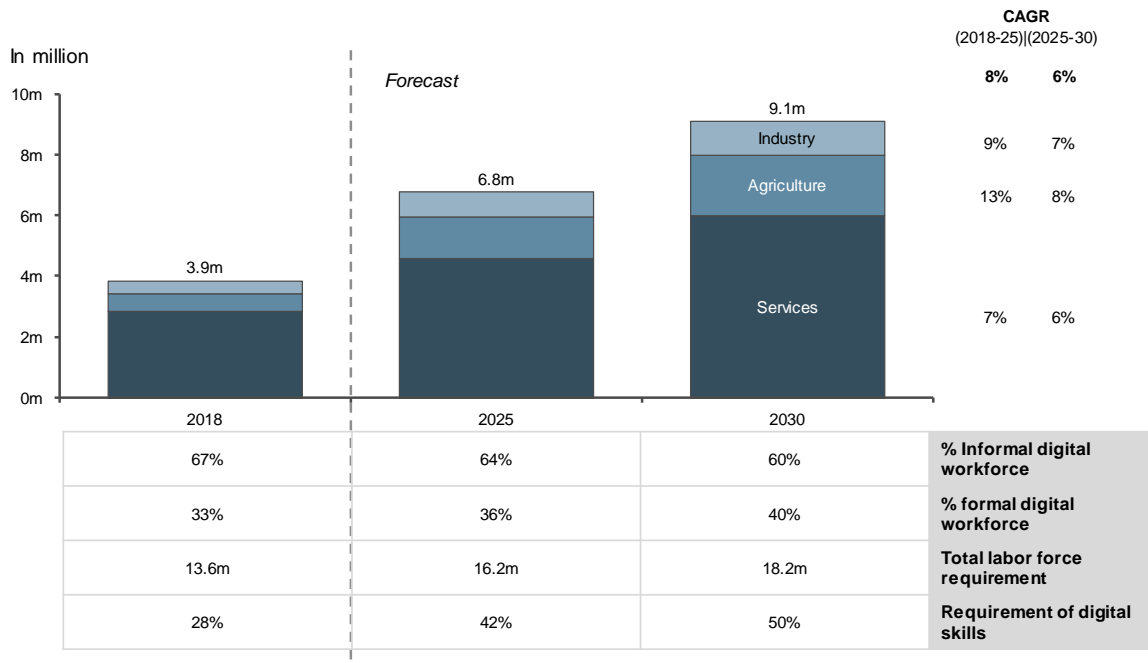
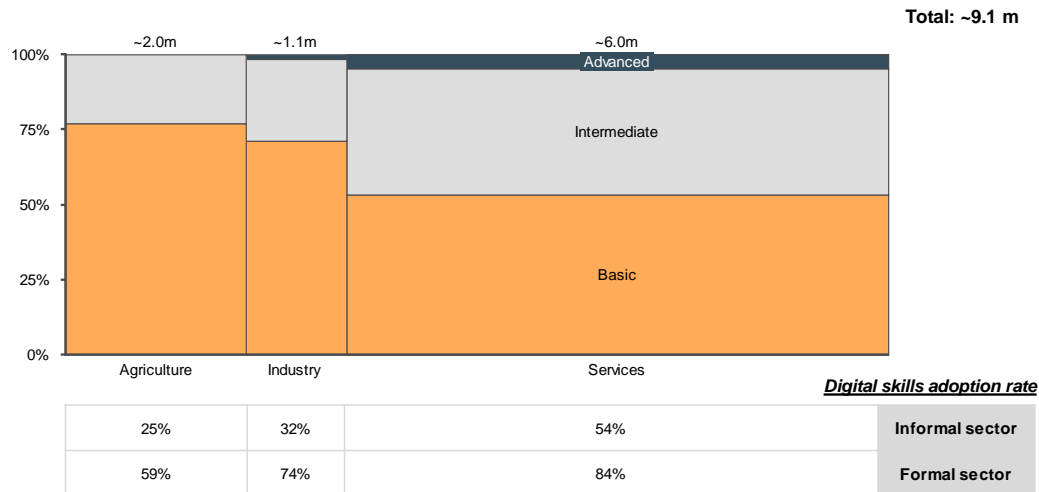


Figure 49: Digital skills requirement in Ghana by type of skills, 2030



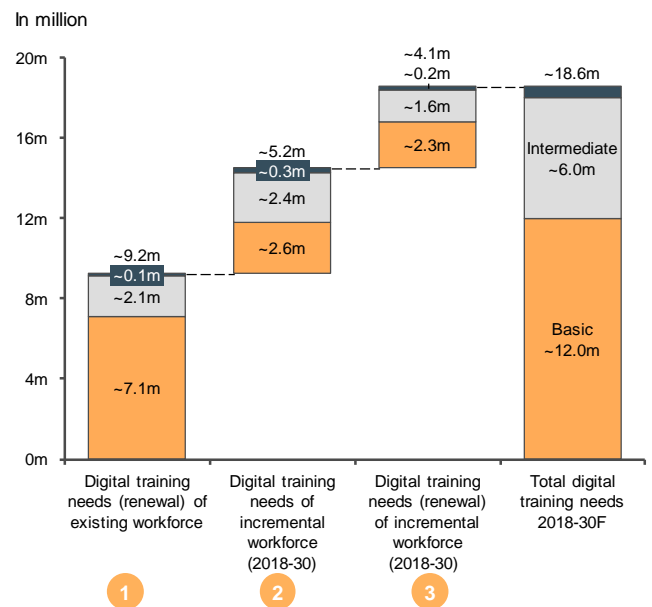
Demand for digital skills in agriculture, industry, and services is expected to reach nearly 9 million workers by 2030. Demand is expected to grow by roughly 8 percent until 2025, and then slow to approximately 6 percent by 2030 (see figure 49).

Some 60 percent of people requiring digital skills will be in the informal digital workforce rather than the formal digital workforce. People with basic skills are expected to make up more than 60 percent of the demand.

Cumulative Demand

Ghana’s labor force demand for digital skills is expected to reach nearly 9 million people by 2030. This figure, however, does not represent the entirety of the training demand. The current digital skills workforce of almost 4 million people likely will need more digital skills training every four to five years, resulting in more than 9 million digital skills training experiences. More than 5 million new people will need training and another 4 million will require additional digital skills training experiences. The total digital skills training needs will climb to nearly 19 million through 2030 (see figure 50).

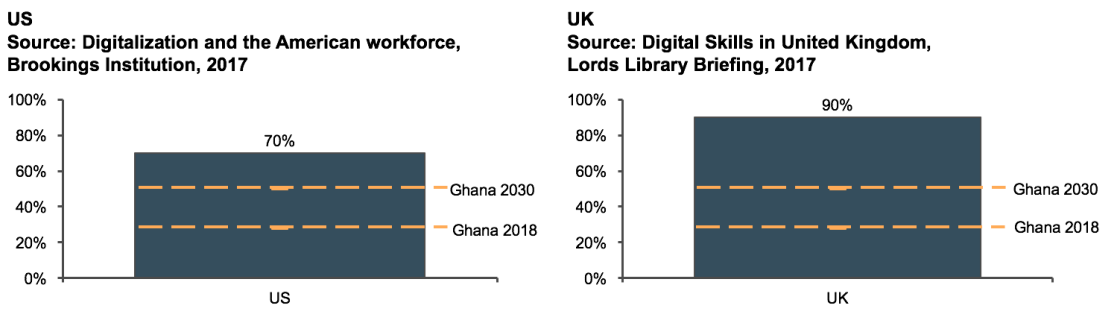
Figure 50: Cumulative demand for digital skills training in Ghana, by level of skill, 2018-2030



- Digital skills training renewal:** It is assumed that the existing digital skills workforce in 2018 (3.9m) will be to be re-trained on digital skills every 4-5 years resulting in training needs for this group of 9.2m opportunities to 2030
- Digital skills training (first time):** It is assumed that the additional (incremental) digital workforce (5.2m) will need to be trained in digital skills at the time of entering workforce resulting in training needs of 5.2m
- Digital skills training renewal:** It is assumed that the Incremental workforce that will enter during 2018-30 will need to be re-trained in digital skills every 4-5 years resulting in training needs of 4.1m

Ghanaian demand for digital skills is not expected to exceed that of developed markets like the United States and the United Kingdom, where 70 percent to 90 percent of all jobs require digital skills (see figure 51). Nor is it expected to surpass Internet penetration rates, which are projected to reach 58 percent by 2030.

Figure 51: Digital skills requirements in the United States and the United Kingdom



Appendix C: Detailed Case Studies

CONTENTS

ANDELA 100 <i>Advanced skills</i> Kenya, Nigeria, Uganda, with administrative offices in the United States	GOOD THINGS FOUNDATION 132 <i>Basic skills</i> Australia, Kenya, United Kingdom
ANUDIP 107 <i>Basic, Intermediate, some Advanced skills</i> India	MEST 141 <i>Advanced skills</i> Across Africa with particular focus on Ghana, Nigeria, Kenya, South Africa and Cote D'Ivoire
DEVELOPERS IN VOGUE 115 <i>Intermediate, Advanced skills</i> Ghana	MICROSOFT 4AFRIKA 150 <i>Intermediate, Advanced skills</i> Across Africa with on-the-ground presence in Nigeria, Ghana, South Africa, Egypt, Uganda, Kenya, Rwanda, Mauritius, Malawi and Ethiopia
DIGITAL HOUSE 123 <i>Intermediate, Advanced skills</i> Argentina, Brazil	UDACITY 159 <i>Intermediate, Advanced skills</i> 190 countries

Andela



Photo © Andela



Program Type
Fellowship



Medium of Delivery
In-person, on-the-job
training



Program Duration
4 years (6 months of
training +3.5 years of
employment)



Annual Participants
1,000+ (500 training;
500+employment)



Organization Type
For-profit



Year Established
2014



**Average Fees per
Participant**
No fees; fellows earn a
salary



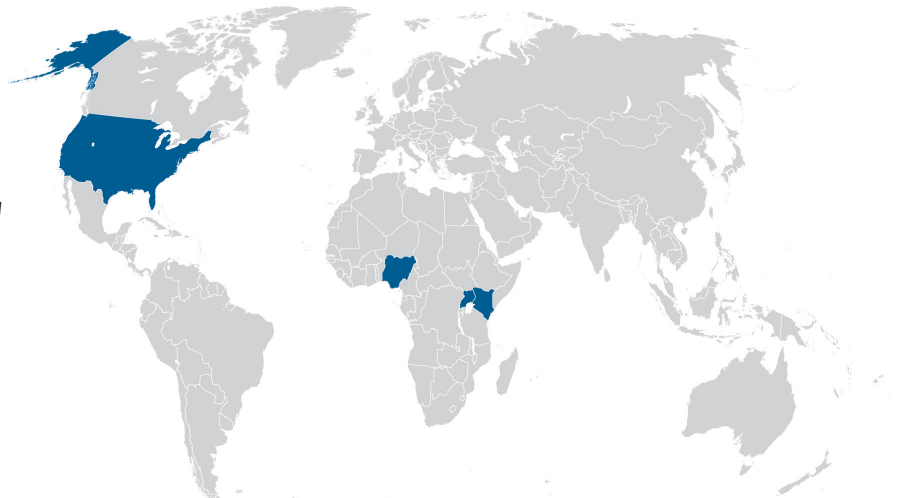
Number of Alumni
~20 (have completed 4
years of the program)



Andela

Geographic Coverage

On-ground presence in Nigeria, Kenya
and Uganda, with administrative
offices in the United States



COMPANY OVERVIEW

Andela is an organization that cultivates IT talent in Africa and provides leading global technology companies with access to a high-skilled resource pool. Andela software engineers participate in a coding boot camp after which they work remotely from Andela's tech campuses across Africa. IFC is currently supporting Andela as an equity investor.

For more information, visit: <https://andela.com/>

Mission Statement

To advance human potential in Africa by investing in talent and ensuring that participants are job ready, while also addressing the global digital skills-shortage faced by employers.

“You must join a community. It may be good to work alone, but it is much better to work in a team. Andela provided mentors to support me all along the process”

— Andela fellow

Key Innovations

Andela is characterized by two features:

1. **Employment-focused Program Provision:** training includes project-based, on-the-job learning for six months with Andela's internal operations teams. For the remaining 3.5 years, participants work with one of Andela's partner companies. By frontloading the program training, Andela ensures that it has a significant pipeline of developers to offer its employer partners, who are often looking to hire developers for long-term projects.
2. **Self-sufficient Model:** the model is linked directly to employer needs, ensuring continued relevance and funding for the training program. Large brand-name employers also attract more applicants to the program.

Program Overview

Andela is a highly competitive program that trains and employs software developers to power technology teams and businesses across the globe. It aims to build a bridge between talent and opportunity. The program provides students with six months of intensive on-the-job training, followed by 3.5 years of remote employment for partner companies, where they work from one of four Andela office spaces in Africa. This is referred to as “distributed employment,” with Andela taking on the role of the distributor. Andela, an IFC investee company, also is backed by the Chan Zuckerberg Initiative, Google Ventures, and Spark Capital.

Program History

Christina Sass, Jeremy Johnson, Ian Carnevale, Nadayar Enegesi, Iyinoluwa Aboyeji, and Brice Nkengsa founded Andela in 2014. They recognized the shortage of technology talent in the United States and saw an opportunity in Africa, where they had worked with and observed talented individuals.

Types of Digital Skills Imparted

The program covers advanced technical skills such as programming and application/software development, including full stack development. The coding basics (Python or Java) are self-taught using Andela's learning resources during the selection process. It also teaches work ethics and team-related skills such as communication, professionalism, and integration.

Business Model

Andela's business model is designed to sustain itself and drive scalability. Employer partners, typically based in the United States, pay Andela to provide vetted, talented, and fully trained software developers. This subsidizes the full cost of the fellowship. Andela held a Series C funding round in 2017 that brought its total funding to over \$80 million. It held a Series D funding round providing \$100 million in 2019, led by new investor Generation Investment Management.

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

Andela targets talented individuals who have the potential to be leaders in the technology sector. Applications are open to anyone over 18 years old and willing to commit to Andela for four years. About 80 percent of participants have previously completed a four-year degree in computer science or engineering and are around 26 years old. Andela has received over 100,000 applications since 2014.

Rationale for Targeting this Segment:

1. **Untapped Talent:** Africa has a large, fast-growing youth population. Andela believes African youth lack the opportunities and resources needed to meet their potential in the technology sector. "Brilliance is evenly distributed across the world, but opportunities are not," is a popular company refrain. The program seeks to bridge this opportunity gap.



Photo © Andela

2. **Demand-supply Gap in U.S. Market:** There are five open jobs for every one software developer in the United States, and most companies say that finding qualified talent poses a major challenge. The recruitment process for these companies often takes two months or more and is costly for each hired developer. Andela hopes to address this demand and supply gap by helping largely U.S. companies hire talented, vetted employees from Africa.
3. **Key Value Proposition:** Participants find the program valuable because it is a fully paid, on-the-job education that will advance their career. For the first six months, fellows go through an immersion program and receive a minimal salary in addition to a MacBook, subsidized housing, and two meals a day. The program also offers significant built-in work experience with top-tier technology companies across the world. When fellows are working for these employers, they receive a competitive salary. Fellows work in well-equipped Andela offices based in Lagos, Nairobi, Kampala, or Kigali and have access to ongoing mentorship from senior engineers that Andela hires.

4. **Key Methods to Find Applicants:** Andela has now developed a strong reputation, which has allowed it to scale up. The organization also uses social media to reach applicants and in 2017 launched a free online learning platform, Andela Learning Community. This platform serves as Andela's "scouting" medium, as it allows the company to track learner progress over time by providing a wealth of data points to identify potential participants who are likely to perform well in the program.

Application and Selection

Applicants fill out an online application and then go through a rigorous selection process. The program is extremely competitive and has a selection rate of 0.7 percent. The selection process takes roughly four months from application to program start.

Students begin by filling out a free application and personality test online. Then they gain access to Andela's home study curriculum, which covers software development and team skills. This helps them prepare for the next technical assessment round. All applicants take that assessment, which is based on either Python or JavaScript. The assessment includes virtual lab assignments with test-driven development code to assess the applicant's mastery of Andela's open-source curriculum.

Shortlisted candidates are invited to interview with a panel of Andela staff members and developers at an Andela office. Interviewers gauge the applicant's commitment and alignment to Andela's values. Applicants who pass the interview are invited to participate in a two-week simulation led by senior Andela developers. This comprises one week of home-based self-learning and one week of product development at an Andela campus. Applicants are evaluated for their alignment to Andela's core values (excellence, passion, integrity, and collaboration), and ability to work independently and with a team.

Key Challenges and Solutions

Andela is committed to ensuring a strong representation of women and aims to have around 30 percent women in each

of its regions. It has set up all female recruitment cycles to encourage women to apply. When Andela notices a lack of female applicants or too few progressing through technical rounds, the company organizes "level-up" programs and workshops for them. This is done in partnership with corporations such as Microsoft.

PROGRAM EXPERIENCE

Program Training and Approach

Fellows undergo intensive, master's level, project-based training during the first six-month period. Then they spend 3.5 years employed at Andela as remote software developers for global technology companies.

Program Approach

Program cohorts comprise 20 to 30 people on average, with an increasing number every year. Andela fellows go through four levels as a part of a long-term, well-defined learning trajectory. The program tracks over 1,000 data points that measure the progress of the developers.

The first six months are spent exclusively on project-based learning. Fellows work on product teams at Andela's offices writing code and incorporating feedback from senior engineers. This training model mimics the process of learning on the job; the "instructors" are senior colleagues. Fellows are expected to begin the program with a firm understanding of basic technical skills, which they would have developed during the rigorous selection process. Instructors teach soft skills during brief sessions throughout the four years.

After the six-month training period, the fellows are staffed as full-time distributed team members at one of Andela's offices. Within a month of their match with a partner company, fellows are sent to the firm's headquarters for two weeks. This is most often in the U.S. and allows fellows to build strong relationships with the team, despite the remote nature of their work. Groups of three to four fellows often are hired as a team by partner employers. Andela fellows usually work for an employer for at least a year. This means



Photo © Andela

that they often have the opportunity to work with multiple employers over the course of four years.

Compensation is linked to level and does not vary depending on the client organization with whom fellows are working. Andela pays its developers in line with market standards.

Retention Approach

Andela has a high retention rate with little attrition. The fellows have an official contract with the organization for the first two years. They are expected to stay through the next two years but are not legally bound to do so. Learning tends to plateau by that point, although fellows sometimes choose to stay because of Andela's competitive employment opportunities.

Instructors

Andela does not have traditional instructors. It aims to teach its developers on the job. Andela fellows are grouped in "pods" with senior developers for support. Andela also has a learning management system that tracks participants' progress and helps customize their professional development plan. Senior developers are experts in the field of software engineering with more than five years of experience and are recruited from top tech firms in Africa and around the world.

Program Evolution

Since its inception in 2014, Andela has added initiatives to spur growth. The Andela Learning Community was launched in early 2017 to create a talent pipeline. It provides free learning resources and access to virtual mentorship that

individuals can use to prepare for their Andela applications or to gain digital skills. Content on the platform is sourced from Andela's partners, including Google, Udacity, and Microsoft. The initiative has attracted 23,000 learners, and Andela has seen course completion rates reach five times higher than the average for global massive open online courses.

Andela places a strong focus on building team skills and communication during its program. Some offices conduct daily team-building activities to engage developers, while others hold frequent workshops. Their approach is driven by data that has identified emotional quotient as important as intellectual quotient for successful placement.

PROGRAM IMPACT

Learning Goals

Andela seeks to develop software developers who are highly employable by the end of the four years. The program focuses on building technical and soft skills and has over 1,100 engineers on staff.

The company uses six attributes to evaluate the performance of developers in a company environment. The parameters by which they are judged depend on their level and determines their growth in the organization:

1. Quality – Designing product architecture and delivering complete products

2. Quantity — Delivering entire systems of interrelated products against timeline
3. Initiative — Organizing meetings and managing project team
4. Communication — Effectively understanding and communicating client requirements
5. Professionalism — Collaborating effectively with a team to deliver the project
6. Integration — Flexibility in coordinating with multiple teams

Skills Developed:

1. Technical skills — Exclusive focus on software, full stack development
2. Soft skills — Focus on team building and communication, built into curriculum

Employment Process

After program completion, developers generally have three opportunities:

1. **Employment:** developers become full-time software engineers for a top global or local technology company
2. **Entrepreneurship:** some participants start their own business or join entrepreneurial ventures
3. **Employment with Andela:** others return to Andela in positions as senior developers, engineering team leads, or learning facilitators

Employment Oriented Initiatives

1. Entrepreneurship Center: The center serves as a local technology incubator, providing technology entrepreneurs with the guidance to brainstorm, network, build prototypes, and set up operations. This initiative is expected to result in the creation of new and lasting local businesses.

2. Andela Alumni Network: The alumni network is built to provide graduates lifelong access to Andela and its resources. The fellows are also encouraged to consult the alumni community for job opportunities.

Employer Perspectives

The Andela fellowship is considered equivalent to four years of employment experience at top tech companies around the world. Participants develop mastery over specific technology, such as JavaScript, Ruby on Rails, Android/iOS application development. At the end of the four years, they possess significant work experience and marketable skills for employers in the technology sector.

Impact

The organization has succeeded in creating a vast community of employable software engineers. There are over 1,000 Andela developers. Almost 500 of the developers are working as full-time employees with their partner organizations. The remaining engineers are still engaged in their first six months of training or are working on internal engineering teams to develop Andela's proprietary technology.

More than 20 developers have completed four years with Andela and either stayed on as senior developers, started their own businesses, or joined other technology firms as developers. Andela expects to double its developer count by the end of 2019. Over the next four years, Andela plans to create high-end technology jobs with supporting staff members across various countries, improve its training program to provide better employment prospects, and reach a larger community through its online learning center.

Developer Perspectives

Andela developers say the key drivers of its effectiveness are the company's inclusive nature, on-project training, and exposure gained by working for the top companies of the world.

OPERATIONS

Resources

Andela has a staff of over 1,700, with more than 1,100 software engineers (fellows from the program, completing their four years of employment at Andela).

Andela hires individuals who believe in its mission statement and values:

1. **Excellence:** lifelong learners who strive for mastery of our craft
2. **Passion:** people who aspire to change the world and act accordingly
3. **Integrity:** individuals guided by strong moral principles
4. **Collaboration:** individuals who build relationships to cooperate and deliver projects

Path to Scalability

Andela plans to increase its outreach to 100,000 developers in Africa by 2024. It aims to leverage public-private partnerships to grow quickly in new regions. The pan-African technology campus at Kigali, for example, was launched in partnership with a government organization that fundraises with international donors. The company aims to repeat this model in other locations.

Africa's increasing youth population, unlike much of the world, has helped Andela grow. The company believes a similar model can be replicated in regions with sizable youth populations that lack adequate access to digital skills training.

PROGRAM KEY MILESTONES & TIMELINE

2014	2015	2016	2017
Andela was founded and its first cohort of fellows were accepted in Nigeria.	Andela went through the Series A funding round and launched operations in Kenya.	Andela went through Series B funding round and launched operations in Uganda.	Andela went through Series C funding round and launched a pan-African hub in Kigali.

KEY PEOPLE



Christina Sass

President and Co-founder, Andela

As the Chief Operating Officer,

Christina helps guide Andela's mission and strategy to build the next generation of technology leaders in Africa. Prior Andela, Christina directed the Program department of the Clinton Global Initiative and advised the President and CEO of The MasterCard Foundation. Christina also has experience in building education and employment programs in China, Gaza and the West Bank, Kenya, and Nigeria.



Jeremy Johnson

Co-founder and Chief Executive Officer, Andela

Jeremy drives the overall strategy and operations of Andela, and has been instrumental in shaping the organization into one of the most coveted technical institutes. Prior to co-founding Andela, Jeremy co-founded 2U, a company listed on the NASDAQ stock exchange.

Anudip



Photo © Anudip



Program Type
Skill development course



Medium of Delivery
Classroom-based



Program Duration
1-10 months
(3 months avg.)



Annual Participants
~15,000



Organization Type
Not-for-profit



Year Established
2007



Average Fees per Participant
~USD 25



Number of Alumni
85,000



Geographic Coverage

100+ centers located across 10 states in India, mostly in rural areas



COMPANY OVERVIEW

Anudip is a digital skills training company in India that has reached over 85,000 students in the past decade. The program targets marginalized groups including underprivileged women, youth, and the visually and physically impaired. It provides basic digital skills training to help learners escape poverty and enter the workforce. These individuals typically earn sustainable wages and reap the long-term benefits of working in a structured environment.

For more information, visit: <https://www.anudip.org/>

Mission statement

To generate sustainable livelihoods for disadvantaged women and youth through market-aligned skills training.

Program Overview

Anudip provides digital skills training to underprivileged women and youth so they can gain employment and earn sustainable incomes. Anudip has reached over 85,000 learners since 2007 through the program's more than 100 training centers across India. It leverages employer-led curricula to ensure students gain the skills businesses need. The company operates on a low-cost model and uses innovative delivery methods to make the program affordable and accessible. Anudip's training and work placement initiatives have helped 60,000 people find jobs.

Program History

Dipak Basu conducted an ethnographic study in 2005 that demonstrated an increase in local employment in India could dramatically improve the lives of marginalized people. In 2007, after speaking with donors and advisors about the concept of market-aligned skills, he established Anudip. The organization uses an employer-led curriculum to ensure participants are trained for what industries need, helping to address the supply-demand gap for digital skills in India.



Photo © Anudip

Photo © Anudip



Types of Digital Skills Imparted

Anudip is focused on helping its students develop core technical and workplace readiness skills. The program provides basic digital skills to all learners, and some additional intermediate and advanced skills depending on individual career aspirations. These include:

1. Basic skills like Microsoft Excel, digital literacy, and workplace IT
2. Intermediate skills like digital marketing and graphic design
3. Advanced skills including ethical hacking, CCNA, and JavaScript

Learners also undergo training in English, financial literacy, and soft skills to ensure workplace readiness.

Business Model

Anudip had an operating budget of roughly \$2 million in 2017. About 80 percent of funding comes from institutional donors. This includes both corporate and foundation donors,

such as Accenture, Cisco, Omidyar Network, the Michael & Susan Dell Foundation, and Citi Foundation.

Tuition fees from participants account for 5 percent to 10 percent of revenue. The relatively low revenue from fees is due to Anudip's commitment to support marginalized and impoverished communities. The program charges only \$25 per student and provides them with the option of making payments in installments. Merit-based scholarships are offered to 10 percent of students.

Other revenue accounts for the remaining 10 percent to 15 percent of funding and includes fees from training programs for external organizations and placement fees paid by employers to Anudip upon successful hiring of a graduate.

The company's major costs stem from training and operation of resource centers, broken down as follows:

1. Salaries and benefits (roughly 45 percent), the majority of which is for Anudip's faculty and trainers
2. Training center operations (40 percent to 45 percent), with a large portion attributable to rent and new equipment purchasing
3. Administrative expenses (10 percent to 15 percent)

Anudip's additional costs in 2017 accounted for almost 95 percent of revenue.

Program Sustainability

Anudip relies on institutional donor grants for the bulk of its operating budget. The budget share of earned revenue has increased from less than 5 percent in 2010 to nearly 20 percent in 2017.

A number of established centers already have reached financial stability, such as West Bengal. These support the viability of the model, which is strengthened through the relationship between communities and employers.

Drivers of Business Model Efficiency

Anudip has expanded from 1,000 students a year in 2011 to more than 20,000 a year in 2018. It has increased funding

from institutional donors and demonstrated significant social impact across India by training 85,000 people and helping 75 percent of those find employment. Anudip focused on securing grants in the beginning and has aimed to consistently reduce operating costs. The success of its business model is strengthened by:

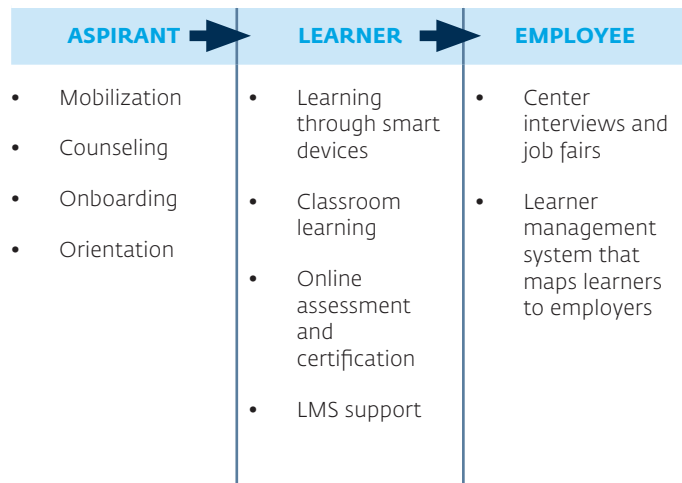
1. Growing global demand for skilled IT expertise
2. Development of an affordable and accessible platform, supported by its centers and use of innovative blended-learning technology to overcome connectivity issues
3. High-quality, market-aligned skills training
4. Work placement rates of more than 75 percent, partially due to its strong network of more than 350 partner organizations

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

Participants must be 18 years and over, have completed twelfth grade, and want to secure long-term employment. Anudip's programs are designed to help people step out of what it has identified as a generational poverty trap. These communities may face large debts and exposure to crime, drugs, and human trafficking. The organization focuses on building employable and entrepreneurial skills that give graduates a chance to earn sustainable wages and enjoy the benefits of employment.

Anudip offers affordable, accessible job-focused digital skills training courses in English that include workplace behavior and personality development classes, as well as a dedicated job placement service. It attracts a high proportion of females—40 percent of all learners—by offering a secure and hygienic learning environment.



Application and Selection

Anudip reaches out to communities with more than 100 Skill and Career Development learning centers. These centers act as hubs that provide training to Anudip learners, as well as engagement with the broader community. Anudip also has partnered with India's National Skill Development Corporation and the Skill India campaign, two government employment initiatives that help build awareness of the program for both potential students and employers.

Learner Journey (Aspirant to Employee)

The program offers a roadmap from aspiring worker to employee. It is open to all applicants who meet the age and education prerequisites. Potential students, known as "aspirants," sign up for Anudip at one of the learning centers. This is called the mobilization phase. Then they undergo a career counselling session with one of Anudip's trainers to assess their abilities and career goals and to help determine what training would work best for them.

During this time, learners are provided with the required study materials and access to the program's innovative blended-learning system, which combines in-person and online training through a cloud-based learning management system.

Key challenges and solutions

Anudip faces challenges in providing a compelling curriculum for less sophisticated learners. The company's target participants often do not have much education and are unfamiliar with the idea of pursuing further studies. Anudip overcomes this by providing a clear roadmap for students from training to certification and employment. The program combines numerous approaches to ensure learners progress through this journey. These include access to remote devices to promote "anytime, anywhere" learning, gamification of course content, live video streaming, and extensive job placement assistance.

PROGRAM EXPERIENCE

Program Approach

Anudip offers a variety of programs for different skill levels. At least half of the students go through a three-month course covering basic IT comprehension and financial literacy. Courses for intermediate skills such as cloud-related services take place for six to nine months. Candidates who struggle to find a job, despite an engineering degree or other higher education qualification, might participate in short workplace readiness and English training courses that typically take one to two months to complete.

Learners can take courses in over 20 different subject areas, including IT fundamentals, digital marketing, web design, and e-commerce services. All courses are complemented by soft skills training.

Course content is developed by Anudip's curriculum department and by partner organizations, such as Tata Consultancy Services, which licenses new courses and teaches the first class of students. Anudip staff then take over teaching.

The program follows a blended-learning format. This combines scheduled in-person classroom time at Anudip's resource centers with self-led learning on smart devices, such as tablets loaned from the company.

Students are taught with an interactive, multimedia curriculum that combines traditional methodology with game-based lessons developed by Anudip to help improve learning and keep participants engaged. Basic courses such as digital literacy, workplace readiness, and English are self-taught; classroom lectures focus on IT skills. Course certifications are provided through an online portal that uses the Pearson VUE platform.

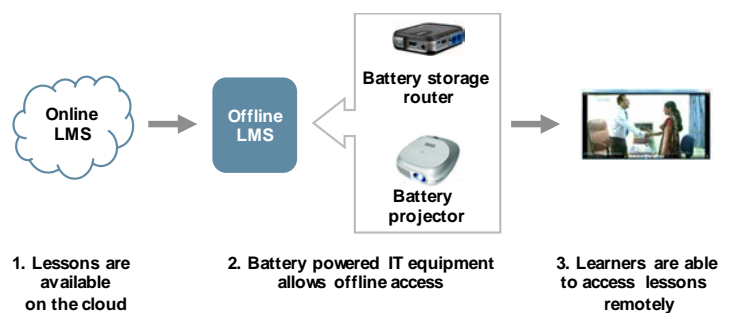
Instructors

Anudip's centers have separate staff for soft skills training, IT training, mobilizing and recruiting learners, and placement activities. Soft skills trainers come from larger cities and have a master's in business administration, bachelor's qualification, or experience teaching English. IT trainers may be certified by Microsoft or Cisco, depending on the course they teach. All faculty members are recruited through traditional channels, such as job boards and placement services. Anudip's learning and development team regularly trains staff on the latest content developed.

Key Innovations

Anudip has developed a blended-learning platform that can be used without electricity and Internet. This is useful given widespread Internet access and connectivity issues in India. The system uses a learning management system with online

Blended Learning Platform



and offline options, a wireless e-storage battery powered router, a battery powered projector, and remote access to streamed training sessions.

Anudip has been able to triple its capacity by shifting from a traditional classroom-based model to a blended-learning model. Many of its classes have moved online, making the program more economic. The company partners with online training organizations, such as Udemy and Alison, to access course content at discounted prices.

Throughout the program, Anudip's learner life cycle management system collects roughly 40 data points and uses data analytics to provide insights on seven modules, from mobilization to retention. This enables the company to match candidates with suitable job opportunities.

PROGRAM IMPACT

Learning Goals

Anudip focuses on developing the following skills:

Technical Skills: These form the basis of digital skills training and follow a curriculum that reflects the specific skills candidates need for the job they want. Completion of a course in these technical skills results in a certification.

Workplace Readiness: In addition to coursework, students

also develop workforce readiness skills through training in workplace English and digital and financial literacy. This broad base of skills enhances employability and learner placement rates.

Many students relocate for employment when they complete the program. Some are intimidated by the concept of moving to a new and larger city. Anudip helps to ease the transition by providing accommodation placement services, as well as a mentorship community and support network that includes program alumni.

Anudip follows a market-aligned training program and prepares its curriculum alongside more than 350 industry partners using industry-standard course curriculum offered by partner organizations such as Udemy, Alison, and Khan Academy. Employer partners help Anudip identify the skills industries need. Many partner employer organizations visit Anudip centers and offer mock interview training.

Impact

Anudip has had a high success rate. More than 85,000 Indian youth and women have trained through the program; females make up 40 percent of alumni. The program cites a



Riya Banerjee, Anudip BIT Mesra

- Riya is an Anudip graduate and resides in a small town in Jharkhand, in eastern India.
- She is employed by Tata Consultancy Services in a customer support role.
- Riya entered the program at 23 to gain experience that helped launch her career. Anudip's strong success rate in placing learners within top corporations made the program attractive.
- At Anudip, Riya studied an Employer to Training course designed by Tata Consultancy Services to train candidates for roles with the firm. She studied courses that included IT and digital skills, reasoning, numerical ability, communicative English, and interview etiquette.

"...The super learning experience helped me get a job in one of the best brands and shape up my career. I never thought I could achieve this without Anudip..."

(Profile from Anudip Website)

Learner Experience

75 percent job placement rate, with graduates joining a wide range of companies that include IT solutions (Amazon, Tech Mahindra, MS Infotech), retail (Spencer's, Reliance, Walmart), and financial services (Kotak, PayTM).

Learners enjoy an average 100 percent to 150 percent increase in salary upon completion. Long-term, sustainable employment has helped improve the livelihood of families and communities of Anudip participants.

Placement Activities

Anudip uses five placement activities that underpin the program's high placement rates:

- Employer to Training:** This forms the core of Anudip's market-aligned approach. Prospective employers help design the curriculum and then outsource the training component to Anudip. Prospective employers may provide an internal trainer to teach the first batch of learners, while Anudip staff mirror the trainer and prepare to teach subsequent cohorts.
- Campus to Corporate:** This activity consists of industry visits and workshops that link learners to potential employers.
- On-Job Training:** The training comprises a mix of interview and job simulation, hands-on experience with partner organizations, and internships.
- DISHA:** DISHA is multi-sector job fair that matches learners to potential employees. These events are organized in multiple locations each year, with employers providing job profiles in advance to match the best candidates.
- On-Campus Recruitment Drives:** These allow partner employers to hire a group of Anudip learners in one go. Candidates come to a central location to participate in a hiring process for jobs within a company.

Employer Perspectives

"Anudip is truly remarkable at finding great talent for our organization. We truly appreciate their professionalism in providing the best candidates who excels in terms of their skills, knowledge and understanding of the sector."

– Human Resources, Spencer's Retail

"Anudip adopts a judicious mix of theory and practical application, which equips its learners with the requisite skills needed in being smart corporate citizens who are ready and articulate."

– Human Resources, ABP Group

Program Evolution

Anudip Foundation was established in 2007 by Basu and a other social entrepreneurs to address critical livelihood needs of people in rural India through IT. The program started with three rural training centers in partnership with local nongovernment organizations.

It incubated the technology services firm iMerit within the company between 2009 and 2010. iMerit delivers enterprise-grade data by powering advanced algorithms in machine learning, computer vision, and data analytics. The close relationship with iMerit continues today as the company provides an employment pathway for learners and takes in around 600 Anudip graduates each year.

Anudip has continued to expand since 2011, achieving growth in multiple spheres:

	2011	2017
Alumni count	~4K	~75K
Staff count	~50	~300
Centers	~20	~100
States covered	1	10
Institutional donors	2	9
Annual revenue	~\$160K	~\$2M
Earned income	~\$20K	~\$500K
Earned income ratio	~10%	~25%

Anudip aims to train 100,000 people by 2020 and become financially sustainable through earned revenue by 2023. The company has been able to achieve scale by operating in a high demand market, understanding industry needs well, and telling a convincing fundraising story to grow donor funding.

Key Learnings

1. Basu has emphasized fundraising as the single most important driver for social impact organizations. Effective fundraising requires delivering on the promised impact and ensuring an effective action plan is in place to grow the program. The numerous awards Anudip has received adds credibility to its fundraising story.
2. Innovation is key to success, although research and development spending is not typically covered by donor funds. Companies may need to use earned income to drive innovation in infrastructure and product or service offerings.
3. Market-aligned training is critical to building a skilled workforce that can address the supply-demand gap in digital skills.
4. Development of soft skills, including workplace English and communication skills, are important in raising students' employment prospects.
5. Connectivity issues with electricity and Internet access are large impediments to skills training. Innovative and cost-effective technologies can be implemented to overcome these issues.

Path to Scalability

Anudip has grown through its use of strategic initiatives. It has established a corporate placement unit with ties to more than 200 IT-enabled services and e-commerce employers, including leading brands such as Tech Mahindra, Amazon, TCS, Flipkart, and Walmart.

It also has recently expanded a virtual-learning platform to offer a blended-learning program. Students learn simple English, digital literacy, and workplace readiness on tablets and smartphones, and only come in to training centers on scheduled dates for reviews and lectures. This has enabled Anudip to double its classroom capacity and grow its student base.

KEY PEOPLE



Dipak Basu

Chairman and Chief Executive Officer

Basu has spent much of his life employing technology in humanitarian missions worldwide. Before starting Anudip, Dipak held senior management positions at Cisco Systems where his last position was Director of Global Center of Expertise.

Basu founded and served for three years as executive director of NetHope, a technology alliance of the world's largest aid agencies. Basu holds a bachelor's from Indian Institute of Technology Kharagpur and a master's in electrical engineering from the University of Southern California.

Developers in Vogue



Photo © Developers in Vogue



Program Type
Coding bootcamp for women



Medium of Delivery
Online and classroom



Program Duration
3 months



Annual Participants
~60 (3 cohorts of ~20 over 1 year)



Organization Type
Not-for-profit



Year Established
2017



Average Fees per Participant
Free



Number of Alumni
~60



DEVELOPERS IN VOGUE

Geographic Coverage

On ground presence limited to Accra, Ghana. Planning to expand across Africa.



COMPANY OVERVIEW

Developers in Vogue is a free, early-stage, intensive coding boot camp for women in Accra, Ghana. The three-month program provides participants with a blend of online and on-site learning. The company aims to help women in Ghana gain the necessary digital skills to secure jobs in the technology sector, while providing them with a community of support.

For more information, visit:

<https://developersinvogue.org/>

Mission Statement

DIV empowers African women to become leaders in STEM fields, and is creating a relevant community of amazing women who are passionate about using technology to revolutionize Africa and beyond.

Key Innovations

The DIV program has two distinguishing features:

1. Cultivation of a Network of Peers: Participants are encouraged to develop strong relationships with their peers that will endure after the program ends. The program is structured to foster community and engage students through team assignments and projects. It also hosts numerous public events, such as hackathons and guest-speaker seminars. DIV believes that a community of women is an essential missing piece of Ghana's digital skills training space and wants to help women excel in the technology sector.
2. Peer Learning: One of the in-person training activities is called "pair programming" because two participants share a workstation. The knowledge exchange that takes place through this setup has led to an improved quality of coding.

Program Overview

DIV is a three-month boot camp program with two months of online sessions and assignments and one month of on-site training in Accra. The program is geared towards women older than 16 and focuses on web and mobile app development, as well as data science.

Key features of the program include:

1. Intensive training (online and on-site)
2. Dedicated one-on-one mentorship from industry experts
3. Collaborative peer learning assignments
4. Exposure to internship and full-time job opportunities and career guidance
5. Interactive activities such as hackathons
6. A final project where students build a product prototype

Photo © Developers in Vogue



Program History

DIV was launched in 2017 by Ivy Barley and Maxwell Cofie, who were seeking to tackle gender disparity in Ghana's digital economy. They created the boot camp to provide aspiring women developers with the opportunity to hone their skills and receive support in finding jobs.

Types of Digital Skills Imparted

DIV focuses on teaching intermediate and advanced digital skills to help participants secure entry-level employment in the technology sector.

Technical skills taught include:

1. Core programming languages, including JavaScript and Python
2. Software and app development
3. Data science
4. Graphic design and digital marketing

DIV also teaches soft skills such as public speaking and presentation, team work, critical thinking, and networking.

Business Model

As a new start-up, DIV is still experimenting with its business model; it intends to introduce tuition fees in 2019. Its funding comes primarily through grants (55 percent), corporations (25 percent), and registration fees and collateral sales (20 percent). Applicants pay a registration fee of about \$30.

Staff

DIV has four full-time and nine part-time staff, and works with over 20 volunteers. These staff members have backgrounds in computer science and technology, as well as prior professional experience.

Planned Growth Goals / Initiatives:

1. DIV's main goal is to increase the scale of the program through a boot camp that is almost entirely online. It will launch in January and serve up to 300 women in one cohort, versus the current 30 per cohort.
2. DIV also plans to introduce a tuition fee with flexible loans to increase the program's financial sustainability.
3. It hopes to drive growth through strategic partnerships that help secure local venues for in-person sessions, rely more on online delivery, and introduce revenue from tuition fees.

Replicability of the Model

The model is replicable but relies heavily on grants and a strong network of local corporations to help graduates find employment.

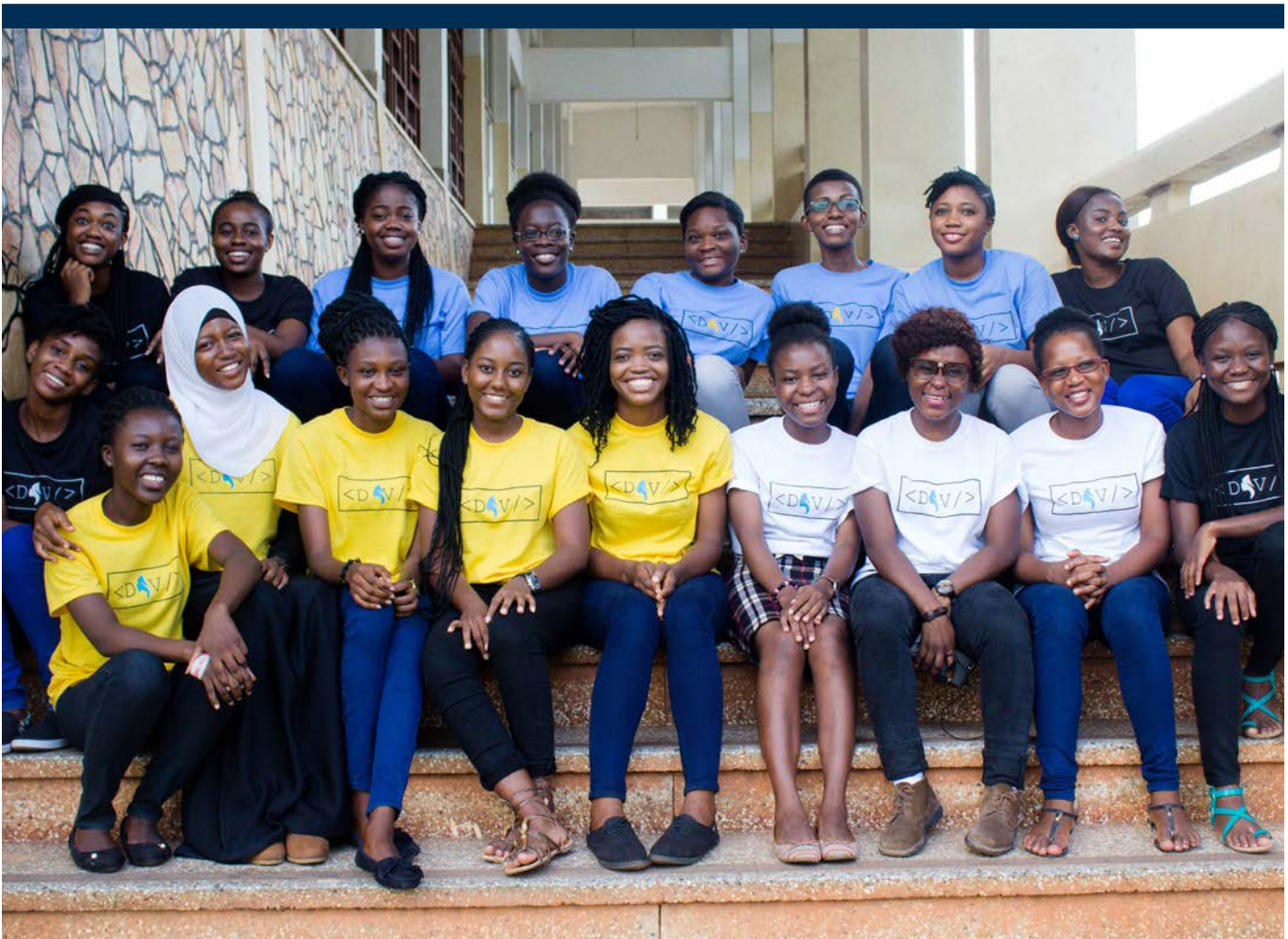


Photo © Developers in Vogue

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

DIV targets African women hoping to secure jobs or start their own technology companies in Africa. The company wants to ensure that more women enter STEM fields and receive the community support they need. DIV looks for applicants with little or no background in technology. The program seeks applicants who meet the following criteria:

1. Women who are over 16 (typically between 18 and 35 years old)
2. Willingness to commit to completing all program requirements including community service projects
3. Passionate about technology and career oriented

DIV offers the opportunity to learn advanced technical skills in a short time frame without tuition fees. In addition to learning technical skills, participants also benefit from the company's community support. The program provides students with extensive mentorship by industry participants, guest-speaker events, hackathons, resume and interview preparation, and internship and job opportunities. Seventy percent of employed alumni have found jobs through DIV's network. Alumni are encouraged to reach out to the organization for help in securing a job through its network. Alumni tend to stay in touch with their peers and mentors.

DIV finds most of its applicants through social media. The company broadcasts its online applications on Facebook, Instagram, and WhatsApp. This channel has proved successful for the organization, which receives roughly 400 applicants for each boot camp cohort, a 20:1 applicant-to-

seat ratio. The application is open for one month, followed by a three-month selection process before the program begins.

Application and Selection

Applicants are expected to complete an online application form with a series of essay questions about their reasons for applying. The application is open for one month.

Selection Process

Application reviews, interviews, and grading is conducted by four volunteer DIV alumni over the course of three months. The process takes place through the following steps:

1. **Online Application Review:** Initial screening of roughly 400 submitted applications
2. **Phone Interviews:** Thirty-minute phone interviews with 80 to 100 selected applicants to gauge their commitment level, passion for technology, and overall attitude
3. **Online Assignments:** Forty-five selected applicants are given weekly assignments for two months and are graded on performance and level of online peer interaction
4. **Final Interview:** Short phone interviews with 25 to 30 applicants to select the final 20

Key Challenges and Solutions

DIV has struggled to find a diverse pool of applicants. The program has taken the following steps to address this issue:

Women Outside of Accra: The program includes a one-month on-site course in Accra. Students must pay for their own accommodation. This limits its participants to residents of Accra or those from elsewhere who can afford accommodation in Accra for a month. DIV hopes to attract women from other cities in Ghana and the wider African continent by launching an almost entirely online version of the boot camp. This would require monthly or bi-monthly meetups instead of a full month on site.

Women Who Cannot Afford Laptops: Participants are required to bring a personal laptop to the on-site sessions. This discourages those who cannot afford their own laptop from applying. DIV is addressing this barrier to application by offering flexible loans without interest to pay for laptops. It has provided seven laptop loans so far.

PROGRAM EXPERIENCE

Program Experience

The program is three months long and participants are encouraged to earn while they learn. They are connected to freelance opportunities and internships in DIV's network, which they can later leverage to help them find jobs. Students are taught how to write resumes, network, and interview for jobs. They spend two initial months completing online lessons and assignments and then one month of intensive on-site training in Accra.

Students are assessed on their performance through frequent assignments, individual and group hackathons, and a final individual project. Students also are required to apply their learning through community service projects.

Participants are introduced to different fields in the technology space after which they select a career path that interests them. They are matched with a mentor in that field, who then provides at least an hour a week of in-person or remote career guidance throughout the program.

Guest speaker events allow participants to interact with well-known role models in the technology space. Past speakers include Vanessa Sanyuake, founder and chief executive of Girls Talk London, and Edem Kumodzi, a senior technical consultant at Andela.

Retention Approach

The two months of assignments prior to an applicant's selection is an effective way to determine their commitment to the program. It also ensures those selected are fast enough learners to keep up with the pace of the program. DIV follows up with each participant once a month in person or by phone to inquire about their experience. The company encourages continued participation by awarding points for event attendance. This culminates in a "developer of the month" prize. Active mentorship and community events also ensure that participants feel continuously engaged.

Instructors

In-person sessions are conducted by experienced industry participants who volunteer their time as teachers and curriculum developers in return for a small monthly stipend of around \$150. There are no standard qualifications in place for teachers, but they serve as strong links to the labor market because they know the practical skills most needed by employers.

Mentors are experienced professionals in the technology space with backgrounds in front-end development, back-end development, user interface and user-experience design, graphic design, app development, cyber security, or data science.

PROGRAM IMPACT

Learning Goals

DIV aims to provide skills that are relevant to the technology job market. It focuses on intermediate and advanced digital skills such as:

1. Core programming languages, including Java and Python
2. Software and app development
3. Data science
4. Graphic design and digital marketing

DIV also teaches career-oriented soft skills. These include:

1. Presenting to an audience
2. Networking effectively
3. Working on a team
4. Critical thinking

Links to Industry:

DIV has established strong ties to the technology industry and has used them to bolster its program. These include:

1. A network of primarily Ghanaian companies in the technology sector that often provide internship and employment opportunities for participants
2. Mentors from the technology industry who provide practical guidance to participants
3. Teachers and other industry participants with an understanding of industry needs
4. Collaboration with local technology companies to conduct sessions and workshops (for example, DIV conducted a program in collaboration with iSpace and Python Ghana)

Impact

The program has had a significant impact on students, which is visible through their skill development and new jobs:

Tangible Skills: Participants have regular assignments to track progress. They must build a product prototype at the end of the boot camp, either an application or program, using the skills they have acquired. They are evaluated on the final product. There also are usually two hackathons during each boot camp, which allow for further monitoring of skills acquired.

Tangible Employment: Half of alumni—about 30 women—have secured employment within less than a year of completing the program. Seventy percent of those have found jobs using DIV's network.

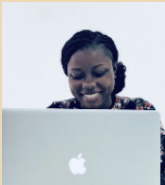
Macro-level Impact: The program seeks to bridge the gender gap in digital skills. It has a small community of 60 alumni, but plans to add an additional 300 women in one cohort next year. This growth will be achieved through a near total online delivery of the program.

Employment Process

DIV provides career support to its participants throughout the program. These initiatives include:

1. Matching interested students with freelancing and internship opportunities to help them earn a salary alongside the program.
2. Mentorship from individuals in specific fields that are aligned to each student's career path goals. These mentors are usually experienced professionals who can share their own experiences and guide students through the job-seeking process.
3. Practical skills development, such as how to ace a technical interview, how to start a technology company, and how to write a strong resume.
4. Directing interested students to scholarship opportunities to study the latest technologies, such as artificial intelligence.
5. Access to DIV's network of local and international organizations to help secure a job.

DIV offers alumni support by connecting them to potential opportunities in their network. The program measures success through the alumni employment rate, which is 50 percent. Alumni have found jobs at companies, such as AgroCenta, Ampersand Technologies, Cavemen and QodeHub. Two recent alumni received offers from Microsoft, DIV's first international corporate partner, to work at its headquarters in Seattle.



Abigail Edwin, **Developers in Vogue alumna**

Learner Experience

- Abigail is 27 years old and is a 2018 alumni of the Developers in Vogue program
- Abigail holds a bachelor's degree in political science and prior to applying for DIV, worked at her family's food delivery business
- She did not have any experience in computer science, but was always interested in learning technical digital skills. This unfulfilled interest, combined with her desire to give back to her community, motivated her to apply
- Abigail learned about DIV through a Facebook post about an interview with Ivy Barley (founder of DIV). She was intrigued by the program's short duration and lack of tuition fees
- Abigail found that the selection process focused primarily on assessing passion for digital skills and commitment to the program. She was selected as a participant
- Abigail felt fully supported throughout the program. DIV helped her secure a freelance job during the program and later a job with AgroCenta, where she is helping to build an online marketplace for farmers in Ghana. Since completing DIV, she has also developed an application to help detect eye cataracts
- Abigail remains in touch with her peers and her mentor from the program

OPERATIONS

Program Evolution

The program has evolved significantly over three cohorts. The first cohort's program was designed to be more flexible in hours of work required and lower in intensity. However, engagement levels proved too low. The second and third cohort were much more time intensive.

DIV is trying to reduce intensity by introducing a boot camp in 2019 that is almost completely online and promotes self-learning. The program also has evolved to provide flexible loans for laptops.

Path to Scalability

DIV has grown through its social media presence on Facebook, WhatsApp, and Instagram platforms. It hopes to expand reach by creating a boot camp that is almost fully online and establishing strategic venue partnerships in other cities and countries. This also will enable DIV to strengthen its industry ties across the globe.

KEY PEOPLE



Ivy Barley

*Cofounder of
Developers in Vogue*

Barley holds a bachelor's in

actuarial science and a master's in mathematical statistics. She has worked as an educator and data analyst, and recently worked as a consultant on the German government's initiative to drive digital skills for women in Ghana. Barley is also Ghana's Women in Data Science Ambassador for Stanford University's Global Women in Data Science (WiDS) conference.

Barley cofounded Developers in Vogue in 2017.

Digital House



Photo © Digital House



Program Type
Digital skills training



Medium of Delivery
Classroom and online



Program Duration
2-5 months



Annual Participants
~3,600 (B2C);
~4,700 (B2B)



Organization Type
For-profit



Year Established
2016



Average Fees per Participant
\$1,600-\$2,000



Number of Alumni
~4,000 (B2C);
~4,000 (B2B)

DigitalHouse >
Coding School

Geographic Coverage
2 campuses in Argentina and
1 campus in Brazil.



COMPANY OVERVIEW

Digital House is a for-profit education company that offers state-of-the-art part-time courses in intermediate and advanced digital skills. It seeks to empower the next generation of talent and technology professionals in Argentina and Brazil. In addition to its main vocational offering, Digital House supports digital skills training at undergraduate and kindergarten through twelfth grade levels alongside other operators.

For more information, visit:

<https://www.digitalhouse.com/>

Mission Statement

To transform the lives of people by providing the digital skills training they need to develop professionally and generate a positive impact in society.

“The experience was intense and very positive; it helped me organize my knowledge and I learned to use several tools. In fact, I came up with the idea of creating a community for woman brewers in one of my Digital Marketing classes when I visited a brewery close to campus along with my classmates.”

— Entrepreneur

Key Innovations

Digital House is characterized by three fundamental program features:

1. **Flipped Classroom:** Digital House uses a pedagogical model in which traditional elements of the lesson are reversed. Students learn theory online at home and participate in practical assignments during in-person classroom sessions under the guidance of instructors. This model helps optimize time with teachers and is only applied to the blended iterations of the courses.
2. **Project-based Learning:** This allows learners to acquire skills and basic knowledge through projects that respond to real-life problems. Learners at Digital House develop group projects, such as a website or mobile application to address a specific issue. The staff then evaluates the final product. The projects allow students to develop complex skills such as critical thinking, communication, collaboration, and problem solving.
3. **Cooperative Learning:** Digital House campuses have co-learning spaces where students may go after school hours to clarify doubts with an on-call teacher and to work on group projects.
4. **Career Orientation:** Digital House recently launched a one-of-a kind bachelor's degree in digital business through a partnership with the University of San Andres in Buenos Aires. Digital House offers a third of the program's content on the Digital House campus and the university is responsible for providing the remainder. The program is founded on the belief that digital disciplines are present in all business, and includes courses such as digital product management, digital marketing, user experience, web and mobile programming, and data analytics. The program also emphasizes the importance of interpersonal and organizational skills, with courses such as leadership and talent management, organizational behavior, and games and strategic behavior.



Program Overview

Digital House aims to help students stay competitive in the global economy. It offers on-site and blended technical courses across three campuses in Argentina and Brazil. The program equips students at all levels to build careers in software development, data science, artificial intelligence, analytics, and digital marketing. Digital House also offers customized training programs to companies for their employees, in addition to supplying digital skills curriculum and online learning platforms for K-12 teachers.

Program History

Digital House was founded in 2016 by a group that included Nelson Duboscq and Sebastian Mackinlay, with a vision to educate professionals and transform companies through innovation. It was established in Argentina and later expanded to Brazil.

Types of Digital Skills Imparted

Digital House offers intensive courses focused on building intermediate to advanced digital skills to make professionals more competitive in the job market. Skills covered in their offerings include:

1. Web development
2. App development (Android and iOS)
3. Digital marketing
4. Product management
5. User experience design
6. Data science
7. Data analytics
8. Artificial intelligence

They also offer executive programs for managers, professionals, and entrepreneurs in technology.

Business Model

Digital House has demonstrated a successful business model that sustains itself through participant tuition fees.

Key drivers of its success include:

1. Offering industry-relevant digital skills training programs
2. Focusing on working professionals with some ability to pay for courses and offering valuable opportunities that ensure students' willingness to pay
3. Driving scale through job-relevant courses and blended-learning course offerings

Model Replicability

Digital House has successfully expanded in Brazil. However, the current model has an on-site component for all courses. If it transitions to a wholly online delivery system, the model will be more replicable.



Photo © Digital House

Key Learnings

1. Campuses are large investments and programs need to make sure to use all of the space.
2. Awareness about market size is critical, as is the ability to leverage potential opportunities with partners from an existing network. This is especially important for developing geographic expansion strategies.
3. Effective marketing is important. As Digital House grows, it is trying to increase notice through organic channels, such as word of mouth.
4. Technology plays a vital role in helping scale and maintain the program.

Funding Structure

Digital House made \$11 million in revenue through tuition fees in 2018.

The organization has raised two rounds of funding since it started in 2016. It received \$4 million in its Series A funding

led by Kaszek Ventures and \$20 million in its Series B funding led by TPG Rise Fund.

Participant Fees

1. Individual courses cost around \$2,000 for five months of intensive part time work, while executive programs cost about \$1,600 for two months of less intensive study. Discounts range from 20 percent to 45 percent.
2. Most Digital House learners are working professionals looking to spend no more than 5 percent to 10 percent of typical university fees.
3. Digital House offers need-based scholarships that cover 30 percent to 45 percent of the tuition fees for 8 percent of its students.

Major Cost Items

The major costs are teacher salaries and marketing.

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

Digital House seeks to help professionals transform companies and stay competitive in a global economy. Digital House's part-time programs usually target employed individuals because advanced digital skills are increasingly required in order to progress professionally. Currently, 80 percent of students are employed. The courses are open to beginners, who get prepared through coursework and assessments during the selection process.

Digital House also runs executive programs for experienced professionals and entrepreneurs, and custom-designed courses for employers across industries. The program targets experienced managers because many in the region could benefit from lessons on new or enhanced digital skills. The program supports them in professionally navigating and managing organizations where technology has become integral.

As all courses have an on-site component, most participants are located in Argentina or Brazil.

Key Value Proposition

Digital House's instructors bring deep experience in professional, entrepreneurial, and research fields. They are well-placed to teach students the practical issues faced on the job.

The program also develops up-to-date course curriculum that is aligned to industry demands. An annual review by Digital House management ensures course content stays relevant and projects simulate accurate real-life scenarios.

Key Methods to Find Applicants

Digital House conducts online marketing to potential students through Facebook, Google, and other sources, such as Acaula, Navent, Viaedu, LinkedIn, Infobae, and iProfesional.

Application and Selection

Each course has 30 to 40 seats available. Completion of pre-work and an online assessment is mandatory for admission. Of the total students registered at Digital House, roughly 85 percent of students successfully complete the pre-work and are admitted.

Key Challenges and Solutions

Digital House courses are more expensive than most competitor offerings. This is a challenge given that the target audience for non-executive courses is early- to mid-career professionals who might not be able or willing to pay a premium. Digital House has encouraged applicants from a broader range of economic backgrounds by offering need-based scholarships that can cover as much as 45 percent of tuition fees.

PROGRAM EXPERIENCE

Program Approach

Digital House focuses on providing an ideal learning environment for the students through modern classrooms, outdoor spaces, conference rooms for group activities, and common learning rooms.

Learners are offered a five-month program with a requirement of 10.5 hours of study a week. Executive programs are only two months long and require student participation for five hours a week.

Students can choose from nine courses and six executive programs that focus on different intermediate and advanced digital skills. The courses are offered in two ways: on-site and blended learning. The on-site model requires students to attend 2.5 face-to-face classes a week while the blended model requires them to attend 1.5 face-to-face classes a week. Both models require learners to spend 10.5 hours a week on classroom and virtual class learning, and an additional three hours for out-of-class practice.

The program emphasizes a "learning by doing" approach by

integrating co-learning projects that simulate real-life situations similar to those present in the labor market. In addition to the adult courses offered, Digital House also partners with K-12 schools to run a proprietary curriculum developed in-house. They have partnered with 10 schools, and their material has reached almost 1,500 K-12 students.

Instructors

Each course has an educational team made up of teachers, assistants, and specialists:

1. **Teachers** are semi-senior professionals in their subject areas who have enough knowledge to deliver the full course by themselves from start to finish.
2. **Assistants** work with teachers in the classroom to support students by answering questions related to classroom content as well as those related to integrative projects.
3. **Specialists** are industry leaders who participate as guest lecturers to deliver specific classes within a module. They help in underscoring the practical application of the digital skills learned.

Teachers are recruited through a technical and academic evaluation from a trial class. Most have a wide range of knowledge and professional experience but do not have teaching experience. Digital House conducts a teacher training session that covers class observation, content co-creation, class planning aligned with Digital House's pedagogy, and ways to use technical and digital resources.

PROGRAM IMPACT

Learning Goals

Key Skills Developed

Digital House helps its students master technical skills including:

1. Programming
2. Digital marketing
3. Product management
4. Design
5. Analytics and data science
6. Artificial intelligence

Courses also help students develop twenty-first century skills, such as agile management, teamwork, collaboration, critical thinking, and creativity to complement the technical skills learned and to increase job-readiness. Digital House constantly updates and develops new content to stay relevant in the digital skills space. Specialist teachers, who are industry professionals, help to update the course curriculum and deliver specific class modules. Instructors, who are industry participants, help to ensure the content covered in the classroom is connected to the latest industry needs.

Employment Process

Digital House students and graduates have access to an online jobs board that includes full-time and part-time opportunities in technology fields with more than 1,000 companies posting their job needs. During the application process, Digital House conducts workshops in partnership with employers that focus on preparing resumes and developing effective strategies for applying to jobs. Together they hold a "recruiting day" where around 30 of the largest companies in the local technology industry come to interview students for jobs.

Photo © Digital House



Digital House has grown to three campuses (one in Brazil, two in Argentina)

Digital House graduates have secured jobs at leading organizations, including Facebook, Coca Cola, IBM, L'Oréal, Accenture, and Telefónica de Argentina. The company also has a digital volunteer program where students and graduates can offer their digital skills to up to 32 registered nongovernment organizations.

Impact

The graduation rate at Digital House is about 90 percent. Most graduates are not looking for jobs; they're seeking to improve their digital skills to perform better at work. Only about 20 percent of graduates are job hunting. These students have placement rates greater than 95 percent, with a payback period of about three months. Graduates cite an average salary increase of around 40 percent. Digital House is involved in the local labor market and maintains relationships with corporations through a recurring recruitment day. This takes place twice a year, once a semester.

OPERATIONS

Resources

Staff

The Digital House team brings an even mix of entrepreneurial and corporate experience. The company has grown from a

10-member staff team with 60 learners in 2016 to a 250-member team with more than 8000 students a year. The academic directors are cofounders of a software development company with two decades of experience in teaching digital skills. Instructors bring extensive professional experience and staff includes technology specialists who support content delivery.

Additional Key Assets

Digital House's three modern campuses in Brazil and Argentina help position it as a school of the future with modern co-working spaces on campus.

Program Evolution

Digital House was established in 2016 with two programs in coding and has since expanded to offer a wider range of digital skills. Every year during a summer-term break, the team reviews each program's industry relevance and updates curricular content. Pre-course material completed by applicants has evolved over the last two years into a more comprehensive introduction to the subject. Organizers also have moved performance tracking from a manual process to an integrated learner management system.

Digital House has expanded its services to K-12 schools and university students through partnerships.

GROWTH TRAJECTORY

	2016	2018
Students enrolled over 2 semesters	360	~3,600
Staff count	10	250
Centers	1	3
Geographical presence	Argentina	Argentina, Brazil
Annual revenue	~\$50K	~\$11M

BUSINESS MODEL

Program Sustainability

Digital House has successfully demonstrated that select segments of the population in emerging markets are willing to pay for digital skills training. It targets those who are able to afford tuition to sustain the program and make profits.

STUDENT EXPERIENCE

Digital House offers a positive learning experience to students through strong course content, practical learning environment, and effective career support.

Carlos Najun Dubos, an alumnus of Digital House, spoke about his experience during his Digital Marketing course in 2018.

"My overall experience was very positive, and I found the program to be complete in terms of content covered. A lot of information was provided in the program and the course offered many useful real-world examples, such as the key analytics tools used in most digital marketing functions."

– Carlos Najun Dubos

Reflections

What was the application process like?

I went through a very simple application process with constant support provided by the Digital House teams. Every course had a variety of schedule and fee payment options to choose from. The Digital House team followed up with leads and provided clear and helpful pre-course material upon making the initial payment.

An online challenge tested the concepts covered in the pre-course material, and interview questions were focused on testing for motivation to pursue the course.

What was the program structure?

I attended three classes a week. I found the curriculum to be well thought-out. Digital House provided access to their content repository, which could be referred to for out-of-class reading and practice.

We were given pre-class reading exercises which amounted to a total of 10 percent of additional time in out-of-class learning.

The integrative project, which required learners to work in groups of three, helped simulate a real-world experience. My team worked towards building a real e-commerce site for one of my teammate's businesses, which sells backpacks.



Carlos Najun Dubos, Digital House Alumni

- Personal and educational background: Worked for 20 years in technology space in Argentina in roles spanning marketing and sales. Charles has recently completed a few marketing courses at Pontificia Universidad Católica Argentina
- Current employment status: Charles is working as a sales executive at DXC Technology (American MNC IT services company)
- Details of the role: Responsible for sales in a specific territory, requiring to work with C-level executives to explain DXC's offerings and how they would help their business

Student Background

The project allowed us to apply the tools learned in the program to a real-world scenario.

What impact did the program have on you?

Digital House reached out to multiple employers to explore opportunities for its learners and connected me to four to five of these companies through a recruitment event. I received support on my overall job search strategy, including help with resume development. It also helped develop my digital-marketing skills and emphasized how these skills could be incorporated in the professional world.

I had been working in the marketing field for a long time and wanted to develop my skills to get comfortable with digital-marketing tools, which I believe are becoming more important for my career progression.

Path to Scalability

Digital House is focusing on building a larger technology platform that provides purely online courses. This is likely to become the primary driver of growth. The company also is considering scaling up its corporate training offerings through more digital content and using its online platform to deliver enterprise training courses. The company also is starting to expand its local venue through partnerships in other cities and countries to help growth without capital-intensive investments. These partnerships also would help expand Digital House's global network.

KEY PEOPLE



Nelson Duboscq
Chief Executive
Officer

Duboscq founded a venture called

World of Business Ideas that created Latin America's first business & management magazine and the largest executive event. He went on to launch an e-commerce platform focused on affordable home design before founding Digital House.











Sebastian Mackinlay
Chief Operating
Officer

Mackinlay is credited for organizing World Business Dialogue—the largest executives conference in the United States. He also worked with World of Business Ideas, where he met Duboscq, then went on to take up leadership roles in technology consulting and marketing companies. He later joined Duboscq to found Digital House.

Good Things Foundation



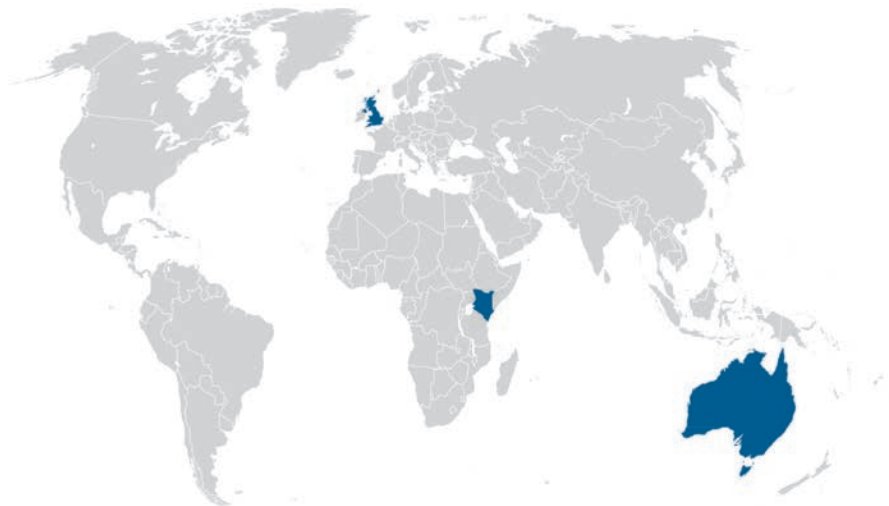
Photo © Good Things Foundation

 <p>Program Type Large-scale digital literacy</p>	 <p>Medium of Delivery Blended-learning approach</p>	 <p>Program Duration Variable</p>	 <p>Annual Participants ~230,000</p>
 <p>Organization Type Private not-for-profit</p>	 <p>Year Established 2014</p>	 <p>Average Fees per Participant Free</p>	 <p>Number of Alumni ~1,000,000</p>



Geographic Coverage

Present in the United Kingdom, Australia and Kenya.



COMPANY OVERVIEW

The Good Things Foundation seeks to improve the lives of individuals through programs that tackle digital, financial, and social exclusion. Good Things' Future Digital Inclusion initiative, covered in this case study, is a free program that teaches basic digital skills to digitally-excluded people. It leverages the Online Centres Network, a platform of more than 5,000 grassroots organizations, to source and support those who have been excluded from the sphere of technology. Good Things Foundation operates in the United Kingdom, Australia, and Kenya and has coached over 2 million students through its basic digital skills training program.

For more information, visit:

<https://www.goodthingsfoundation.org/>

Mission statement

Using digital technology to support equal opportunity, with the aim of empowering individuals to participate fully in today's society.

“We develop Learn My Way quite regularly. The context is always changing and we're always thinking about user experience. We try to make it a useful tool with relevant content to as much of our network as possible.”

– Emily Redmond, Service Designer,
Good Things Foundation

Key Innovations

Good Things Foundation has two unique characteristics that have helped it to achieve impact:

1. **Delivery Model (Online Centres):** The program is delivered through a diverse set of more than 5,000 local online learning locations that include libraries, small community centers, social housing associations, and businesses
2. **Personalized, Informal and Flexible Approach:** Participants who walk into Online Centres are typically greeted and encouraged to share their stories through an informal conversation. This seeks to ensure participants feel comfortable. The flexible and learner-centric approach helps participants learn at their own pace and improves overall program retention.

Program Overview

Good Things Foundation's Future Digital Inclusion program teaches basic digital skills to those with limited IT experience, including many unemployed, disabled, and low-skilled people. The program receives funding from the British government's department of education. FDI leverages Online Centres. These locations provide free or low-cost access to the Internet as well as informal, flexible and personalized training in basic digital skills. FDI provides a range of training resources, including the Learn My Way online platform. This platform is a website built by Good Things Foundation and provides free online courses to help develop digital skills.

Program History

The British Government in 2000 helped establish LearnDirect, an organization that provides employability-linked literacy and numeracy training through a network of community-based Online Centres. Good Things Foundation grew out of that organization in 2014 when Helen Milner, its chief executive, saw the power of the Online Centres and their potential for digital inclusion programs. The Government's Department of Business, then known as the

Department for Business, Innovation and Skills, recognized the importance of digital inclusion and provided funding for the Future Digital Inclusion program that year. Since then, funding for the program has come from the Department for Education.

Types of Digital Skills Imparted

The program focuses on imparting basic digital skills, including:

1. Digital literacy
2. Using a computer or mobile device
3. Basic internet usage
4. Online safety
5. Finding a job online
6. Improving health online
7. Managing money online
8. Accessing public services online

The FDI program provides training in these skills to promote inclusion in the digital economy and assist people in becoming more self-sufficient. Individuals can request to learn skills they find interesting, such as digital photography. Some parents also come in to learn basic digital skills that they can pass on to their children.

Business Model

Good Things Foundation

Good Things Foundation runs as a charitable organization and receives almost 80 percent of its funding from the government. The remaining 20 percent is contributed by companies, trusts and foundations. It has an annual operating budget of nearly \$4 million alongside a \$7 million grants budget for local partners.

Online Centres

Most Online Centres are funded by community organizations and local governments. Good Things Foundation provides the resources and training materials required to deliver the FDI program at these locations and may offer some funding to support it. The foundation provides funding to 169 Online Centres through the FDI program. Online Centres raise funds by running small enterprises such as a café or gym on the premises. These generate revenue and help sustain operations. Centres also bring in revenue through their libraries or through chargeable courses for more advanced skills.

PARTICIPANT SOURCING AND SELECTION

Target Segment and Value Proposition

About 11.5 million adults in the United Kingdom lack basic digital skills, according to Good Things Foundation estimates. The FDI program is targeted towards members of society who may not know how to use digital tools in everyday life. Participants are often older, from disadvantaged backgrounds, unemployed, recent immigrants, or disabled.

The program does not reach out to specific individuals, but targets communities and locations that have a higher occurrence of poverty. People who lack basic digital skills often face societal exclusion as the world is increasingly moving online. They tend to be less educated and lack the ability to access information that would teach them new skills. This limits their ability to find jobs or access health services.

FDI provides people with an open and in-person training program that is delivered in a community setting. It helps individuals gain the confidence and skills to perform day-to-day digital tasks, complete transactions, and access government services.



Application and Selection

Good Things Foundation does not operate a formal participant outreach and selection process. It relies on the Online Centres to serve as outreach hubs for potential participants. They attract people from a range of backgrounds by operating as an open and social space, much like a community center.

Participants are typically referred to an Online Centre by jobs agencies, friends, family members, or other partner organizations. Some participants also may learn about the program while visiting an Online Centre to use its other facilities. In such scenarios, those who are interested can speak with staff to learn more about the program and begin training.

Online Centres are increasingly undertaking outreach initiatives where staff visit communities and neighborhoods to meet with target participants and conduct information sessions.

Learner Profiles

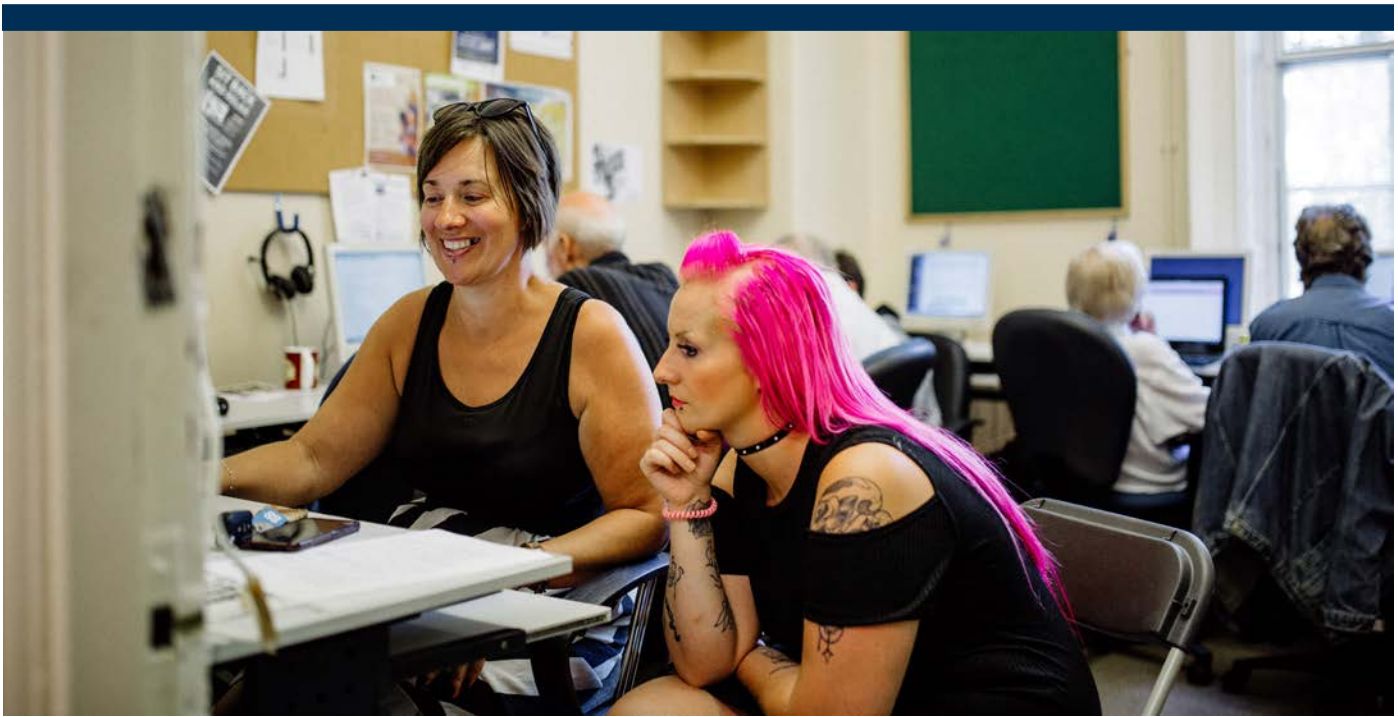
The FDI program caters to a wide range of people from diverse backgrounds with different attitudes towards

learning. Good Things Foundation has conducted longitudinal surveys of participants in the program and identified three broad trajectories that most learners follow:

1. **Ownership:** Participants who follow this trajectory are typically those who have experienced a period of crisis such as unemployment, homelessness, or a disability. After going through the crisis, they decide to invest in their improvement. These participants are more likely to take ownership of their learning and rely on the Online Centres for support and solutions to specific problems. They also tend to learn faster as they develop more confidence in their new skills.
2. **Episodic:** These participants often have faced employment-related crises prior to joining the program. They tend to look at Online Centres for employment support and prioritize job-seeking over wider digital skills. These learners do pick up digital skills but often do not end up taking ownership of their learning. They learn valuable skills that help them to engage digitally, but not to the same extent as ownership learners.
3. **Reluctant:** Reluctant learners have a similar background to that of episodic learners but are generally uninspired by the use of the Internet and digital technologies and tend to learn at very slow pace. Reluctant users often look at digital tools and ask, "What's in it for me?"

Understanding the range of learner profiles has enabled Good Things to manage and retain learner excitement. The challenge of disengagement among episodic and reluctant learners limits the potential upside that basic skills training offers. The program addresses this challenge in two ways:

1. **Digital Champions:** These are former participants of the program who come back to the Online Centres to help train and mentor current participants. Digital champions are typically better equipped to understand the challenges that learners are facing, and the informal, in-person approach helps make participants more comfortable.



2. **Interest-led Learning:** This involves looking at digital skills training through the lens of practical use, such as learning how to use a digital camera and send pictures over email. Many participants are unaware of how digital tools can be used, and by framing the training as a life skill, participants often take more ownership.

PROGRAM EXPERIENCE

Program Training and Approach

The FDI program has no fixed duration as learners have different starting points and learn at their own pace. Participant engagement with an Online Centre can vary from several weeks to a few months.

Online Centres typically start by assessing participants' prior knowledge and skills through an informal conversation. This helps determine which skills should be taught.

The program is designed to fit the individual needs of participants. Some learners may choose to participate in group sessions while others may want to follow a one-on-one or smaller group format. Most Online Centres also offer opportunities for peer learning through the digital champions initiative.

All training material is developed internally by the Good

Things Foundation and distributed to the Online Centres network. The program offers physical training materials, as well as the online Learn My Way platform and Capture IT. Capture IT is a tool outside Learn My Way that tracks skills acquired by participants and develops records for them. The information is saved within the program's Management Information Tool and is accessible to all Online Centres within the network. Good Things does not mandate a strict approach to training, but instead allows for flexibility in each location. This ensures Online Centres can customize content to fit their local users' needs.

The FDI program can expand because of the flexibility of its training resources and approach. The materials and the Learn My Way platform have been developed to promote transferability. Learn My Way is open to anyone outside the Online Centre network and can be easily accessed through the platform's website.

Online Centres can measure course progression using the Learn My Way platform or with the Capture IT templates provided to them. Forty percent of learners use the Learn My Way platform, and the rest leverage physical resources at the Online Centres. Instructors often are program alumni or volunteers who believe in the foundation's vision of digital inclusion and are willing to devote the time and effort towards the program.

PROGRAM IMPACT

Learning Goals

Good Things Foundation strives for a world where everyone benefits from the use of technology, and people are happier, healthier, better off, digitally able, active, and equal.

FDI helps to build digital basic skills. Learners typically go through several stages during the program as they increase their understanding of digital tools. They should feel confident about using digital technology when the program ends. Other skills include:

1. Using online banking
2. Applying for jobs online
3. Accessing national and local government services
4. Using the Internet to communicate

Indirect Economic Benefits

Benefits Due to Digital Use

As FDI learners develop digital skills, they begin to use cost-effective online channels for their transactions with public services. This direct channel provides an economic benefit, which is evaluated through a participant survey at the end of the program. Learners are asked how their behavior has changed in relation to government services. The answers are used to estimate the reduction in calls and visits to public services as a result of their increased adoption of digital options.

This shift led to a decline of visits in 2016 and 2017 to general practitioners and emergency departments, as well as fewer calls and visits to job centers. The organization estimates the reduction in demand for local council service reached \$64 million.

Wider Economic Benefits

The broader benefits include increases in employment, earnings and retail transactions, efficiencies in

communication, time savings from using online channels, and reductions in government spending on benefits and healthcare. In 2016 and 2017, the organization estimated the program's wider economic benefit at about \$130 million.

Key Social Benefits for Learners

Basic digital skills help learners move toward employment, further training, or volunteering roles after the program. Learners witness improvements in their health as they are better able to manage healthcare online and access health advice remotely. Participants can build stronger relationships with friends and families as digital tools, such as social media platforms allow people to stay in touch with their loved ones online and make new friends. The program also helps participants to better access their hobbies and develop an improved sense of confidence and independence.

Key Benefits for Government

The program has direct economic benefits due to a shift away from more costly in-person delivery of government services. More broadly, increased levels of digital skill literacy help to boost personal productivity and help people find work, reducing vacancies in the labor market.

Program Impact

Good Things Foundation has helped more than 1 million people through its FDI program since 2010. Around 90 percent of the program's learners progressed to further learning in 2016 and 2017, while around 60 percent of them reported feeling happier due to the increased social contact that resulted from their experience at the Online Centres.

Overall, 36 percent of FDI learners go on to receive further qualifications in IT, math, and English from local colleges and adult education services. This is nearly double the rate of other external further education providers.



OPERATIONS

Resources

Good Things Foundation's core team has about 60 people in Sheffield, England and 12 people in Sydney who are a part of the new emerging team in Australia.

Key Staff Skills and Competencies

The technology and digital teams are critical to the success of the foundation as they are responsible for designing and maintaining all the digital platforms, including Learn My Way. The marketing and sales teams help spread awareness about the initiative's programs. Another team that includes the chief executive communicates with government and helps ensure continued funding.

Key Learnings

Good Things Foundation has identified four program elements that drive the success of the FDI program, especially when compared to other further education courses:

1. **Ease of Access:** Online Centres are located in the heart of disadvantaged communities. This makes it cheaper and easier for less-motivated learners to undertake the program.
2. **Familiarity and Informality:** The open-door, people-centric model of Online Centres is less intimidating to learners who may have had a negative experience in formal education or limited education at all.
3. **Low Barriers:** Some cultural groups may be unwilling to attend mainstream training for cultural reasons, such as mixed gender classrooms. This is alleviated by placing training within community centers.
4. **Support for Families:** Online Centres offer the flexibility to undertake learning that fits around childcare obligations. Some locations also offer childcare facilities to allow full-time training for parents.

Path to Scalability

The Learn My Way platform, which offers free online learning modules, helps to drive scale by reaching more people through the Internet. Its partnership with the Online Centres network offers a content distribution network that would be impossible with Good Things Foundation's network alone.

Digital Champions recently began providing training and mentorship at the Online Centres, and some are using peer learning to improve the training process and build networks within the community.

OVERVIEW OF THE KENYAN PILOT PROJECT | Digital Life: Kenya

Program Origins and Goals

Good Things Foundation launched the Digital Life: Kenya pilot project in July 2017. The program aims to help Kenyans improve their lives through digital access and to evaluate how the Internet can help alleviate economic and social challenges.

Organizers chose Kenya because they wanted to test whether elements of the FDI program could be transferred and replicated in developing countries. They sought to understand the social challenges people in Kenya face and how the United Nation's Sustainable Development Goals can relate to digital skills.

Program Overview and Format

The Digital Life: Kenya program was designed to replicate the United Kingdom's Online Centres network on a smaller scale. The foundation partnered with the Kenyan National Library Service to help library users explore the benefits of digital skills and the Internet. Program members selected 10 libraries to take part in the pilot and receive face-to-face training and 52 more libraries to receive the training and information digitally.

The program also created a buddy program that links 12 Kenyan libraries with Online Centres in the United Kingdom and Australia. Buddies are able to share experiences, challenges, and best practices in digital skills training.

Results

Digital Life has helped more than 1,000 people in Kenya gain new skills and access the digital world. The program has trained about 20 librarians as "digital champions" on Learn My Way Kenya. The platform was made available to all participants in the pilot.

The program has three critical success factors:

1. **Advocacy and Thought Leadership:** The initiative succeeded in advocating the importance of digital skills in the country and their economic and social benefits.
2. **Access to Free Resources and Tools:** The pilot has helped libraries gain access to curriculum as well as tools and resources needed to help library visitors learn basic digital skills.
3. **Progression to Jobs and Further Education:** Participants, most of whom had no digital skills, considered this program extremely valuable. The certificates of the program became increasingly popular with learners, who made use of them in job and university applications.

Key Learnings

While the Digital Life: Kenya program has had a visible impact in Kenya, key challenges for the program include:

1. **Tailoring Content for the Audience in a New Region:** The Learn My Way resources were designed for people with an English reading age of eight. These materials were not accessible for people from the rural parts of Kenya who had no English language skills.
2. **Replicating a Delivery Method May Not Reach the Same Target Audience:** Unemployed and underprivileged people in the United Kingdom are core users of Online Centres. The Kenyan pilot has mostly reached the demographic that visits libraries and accesses resources there. The most socially and

continues next page

digitally-excluded Kenyans do not visit libraries and thus the program has not reached the same audience as in the United Kingdom. Organizers realized they need to compensate for this by increasing earlier social outreach.

3. **Ensuring a Strong Network Management and Outreach:**

The program team found it difficult to manage the network from a distance. This reinforced the importance of relationships with more local partners to ensure on-the-ground presence and management.

KEY PEOPLE



Helen Milner
Chief Executive

Helen has been working closely with the

government of the United Kingdom since the 1990s with the aim to ensure that no one is left behind as the world becomes increasingly digital. Milner was also a specialist government advisor of digital engagement for the Public Accounts Committee until May 2017. Helen was listed among United Kingdom's 50 most influential women in technology by Computer Weekly in 2017

MEST



Photo © MEST



Program Type

Incubator, Startup Accelerator



Medium of Delivery

In-person training program



Program Duration

12 months of training followed by 12-18 months in incubator



Annual Participants

60



Organization Type

Private non-profit



Year Established

2008



Average Fees per Participant

N/A — Fully funded by Meltwater Foundation



Number of Alumni

300



Geographic Coverage

Presence across Africa with particular focus on Ghana, Nigeria, Kenya, South Africa and Côte d'Ivoire.



COMPANY OVERVIEW

The Meltwater Entrepreneurial School of Technology offers graduate-level entrepreneurship training in business, communications and software development for African youth. MEST was launched in Ghana in 2008 and expanded into Nigeria, Kenya, and South Africa over the past decade. It was established by the Meltwater Foundation, the non-profit arm of Meltwater, a Norwegian software company. MEST was founded to train and mentor young Africans so they can develop their technology skills and become future software entrepreneurs. The Meltwater Foundation's long-term goal is to create wealth and increase jobs in Africa.

For more information, visit: <https://meltwater.org/>

Mission statement

To equip aspiring African entrepreneurs with the necessary technological skills needed for successfully launching a start-up. The program aims to provide students with extensive hands-on project work, culminating in a final pitch and the chance to receive seed funding.

“We want people who are passionate about technology and are keen on launching a start-up. Our program focuses on recruiting students at the beginning of the pipeline, even before they have ideas for their companies.”

– Tobi Lafinhan, Recruitment Manager, MEST

Key Innovations

MEST is characterized by three unique features:

1. Many startup programs focus on people with well-developed ideas. MEST targets potential entrepreneurs before the idea generation stage.
2. Three capstone projects allow students to launch prototype companies into the market before their real business pitch, giving them plenty of practical experience.
3. The program invites top executives to give guest lectures and provides close interactions with them over two to three days. This offers students a chance to build networks and discuss their ideas.

Program Overview

MEST aims to help participants launch global software start-up companies that leverage African talent. The program offers a full time, 12-month sponsored program in Accra that attracts top talent from Ghana, Nigeria, Kenya, South Africa, and Côte d'Ivoire. The participants, or entrepreneurs-in-training, complete a graduate-level course in software development, business, and communications.

Participants form teams of three to four to work on a start-up idea and present their final business plan to a board of investors. Typically, half of the 15 to 20 teams receive seed funding of \$50,000 to \$200,000. These successful teams go on to participate in the MEST Incubator program for an additional six months.

Program History

MEST launched in Ghana in 2008 as the first integrated entrepreneur training and start-up incubator program. Founders chose Ghana as the site for their headquarters because of a number of positive macro-economic attributes, including political stability, high education rates, good English language proficiency, and international flight connectivity. The program is focused on software development due to the relatively low initial cost of buying a computer.

Photo © MEST



Types of Digital Skills Imparted

Technological skills are at the heart of the MEST initiative. The program aims to develop three core skill sets needed to successfully launch a start-up: business, communication, and technology skills. Technology skills focus on advanced digital skills related to software development. These include core programming languages, Scrum & Agile development, Java programming, key performance indicators and web analytics, developing algorithms, user interface, user experience and web development.

Business Model

MEST sustains its operations through a number of patrons. It is supported by the Meltwater Foundation and, to a lesser extent, corporate sponsors such as German-based software company SAP. The operating budget allows MEST to run a team of about 15 employees across Africa and Silicon Valley and operate the MEST campus in Accra. Participants are not required to pay any program fees and MEST provides housing and free meals to students.

MEST also offers annual seed funding to the promising start-up ventures that enter the MEST Incubator. This funding is provided in return for a minority equity stake in the new company. MEST recently opened its incubators to

outside start-ups, increasing the scale and vibrancy of the its network.

Multiple partners provide non-financial support to MEST participants and portfolio companies, including web hosting by Amazon Web Services, free software subscriptions from Microsoft, access to Internet services by Internet.org, legal counsel from DLA Piper, and technology from Samsung and Vodafone.

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

MEST Founder Jorn Lyseggen recognized Africa housed a vast supply of potential talent but lacked resources to fuel entrepreneurs. To tap into this potential, MEST targets Africans who are interested in starting their own software companies. The program was founded in Ghana and has expanded to receive applications from Nigeria, Kenya, South Africa, and Côte d'Ivoire. Applicants must have a degree from a top university or technical college and demonstrate an interest in technology. Candidates with prior work experience in the technology sector are preferred, although previous coding experience is not a prerequisite.

MEST gives its participants a platform to launch a global start-up with training, mentorship, and seed funding integrated into one innovative program. The program also brings in guest speakers, such as executives of leading companies, to interact with participants over dinner. The program aims to develop the skills and network necessary for students to develop their own initiatives and enhance the global visibility of successful African software companies.

While the program has traditionally used online marketing to find applicants, it also has begun to leverage community and partner networks as a part of its outreach. Program outreach includes:

1. Online marketing accounts for around 50 percent to 70 percent of applications. This medium has broad reach and attracts technology-proficient applicants.



2. Community networks bring roughly 15 percent to 20 percent of applications. MEST has recently started looking for applicants through communities of developers, such as those at Facebook.
3. Physical marketing is responsible for around 15 percent to 20 percent of applicants. MEST leverages partnerships with educational institutes to develop a pipeline for promotion such as Moringa School in Kenya and Lancaster University Ghana.
4. MEST has focused on longer-term pipeline development recently by engaging with students through internships and outreach events. These are aimed at generating interest in the program by allowing students to build a strong profile before submitting their application.

The lead time from application to program start is about six months. Applications close in February, followed by interviews in April and program commencement in August.

Application and Selection

Applicants must follow a rigorous vetting process. It starts with an online form followed by a series of tests and in-person assessments to evaluate applicants' analytical thinking, business acumen, and interest in technical entrepreneurship.

Selection Process

1. **Online Application:** Applicants are required to fill out an online form and submit their resume along with a letter of reference.
2. **Aptitude Test:** The test is a modified version of the Graduate Management Admission Test and includes five to six sections covering business, logical reasoning, quantitative aptitude, entrepreneurship, and English language skills.
3. **Phone Interview:** MEST has a 10 to 15-minute conversation to measure the applicant's interest in the program.
4. **Group Interviews:** Interviews are conducted in five countries by a set of panelists. The process includes various tasks and activities to assess each applicant's teamwork capabilities and ability to think on his or her feet.
5. **Final Interview:** Outstanding candidates are offered a one-on-one interview to gauge their motivations and overall fit for MEST. Interviews last up to 45 minutes.

MEST has improved its recruitment process over time and now is confident in finding exceptional students from a large pool of candidates. One key change has been a reduction in the interview panel from 15 people to five. These evaluators now include general managers, recruitment managers, and a Meltwater representative. This change ensures that candidates who are successful in gaining a place on the program are highly entrepreneurial and business-oriented.

Key Challenges and Solutions

1. **Visibility of Candidates with Relevant Interests:** Online marketing has historically reached a large, indiscriminate audience. This is problematic for MEST, which has a specific target audience. The organization is able to engage in more targeted marketing through partner networks.
2. **Pipeline Development:** MEST has struggled with

building a long-term pipeline of participants. The program opens internship opportunities to students from partner universities in an attempt to find candidates with a strong interest in entrepreneurship. This gives them time to show how they fit MEST and its mission.

3. **Region-specific Challenges:** The program has received fewer applications from countries such as South Africa, in part because of greater opportunities in technology and entrepreneurship training. In Nigeria, a large portion of applicants are not fully engaged in the application process and do not end up completing it.

PROGRAM EXPERIENCE

Program Training and Approach

MEST is designed so students benefit from multiple teaching methods over a one-year period. Training sessions are usually offered on-campus at the MEST Center in Accra. The program is divided into four quarters, each focused on different aspects of the start-up process. These include programming and core business skills, software development, prototype business plans, and a final investor pitch.

The program approach changes each year depending on market needs, but consistently focuses on the core skill sets related to business, communication, and technology. Class experience accounts for 80 percent of student learning and is split across lectures, field time for market research, free time for attending events, meeting group members, and exploring Ghana.

Students work on three capstone projects where they simulate the process of creating a business, from idea generation to market launch. These projects enable them to gain practical experience before their final business pitch to investors. About half of the final business pitches receive seed funding. The MEST Incubator program then continues for an additional six months for ventures that were able to secure funding.

PROGRAM TIMELINE

1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER
Programming skills & core business content	Software development life cycle	Idea to prototype business plan & pitch completion	Pre-incubation & final investor pitch

Student retention has not been a problem for MEST, with only two or three participants out of 60 leaving the program early each year.

Instructors

MEST ensures that its staff is highly qualified. Senior faculty members generally have at least 20 years of experience in their industries and come from international consulting firms, Silicon Valley start-ups, and software companies. Global teaching fellows include engineering and computer science graduates recruited from top universities in the United States, Europe, and Ghana, as well as Master of Business Administration students or alumni who have led successful entrepreneurial ventures. Throughout the program, guest lecturers also travel to Ghana to mentor and network with students. Staff and teaching fellows with technical expertise come from the MEST alumni network, its partner network, and through recruiting agencies. Technical expertise allows fellows to provide guidance through all phases of the program, including technological product iterations.

PROGRAM IMPACT

Learning Goals

Instructors ensure that learning is a holistic process for students. Learning goals cover three skills areas:

1. **Communication:** MEST believes in the importance of communication skills to successfully articulate business ideas. Instructors place a strong emphasis on building communication skills through group activities and



Photo © MEST

capstone pitches.

2. **Technical:** MEST focuses on developing “full stack” technical skills rather than generic coding. This ensures each participant has a holistic set of digital skills that can be applied within each market.
3. **Business:** Developing future business owners is integral to the MEST vision. Classes focus on establishing knowledge in basic marketing, project management, sales, leadership, and organizational skills.

Participants also develop soft skills that are necessary for success in business. Evidence for this lies in the consistent success MEST participants have in business competitions that call for soft skills, such as communication and teamwork.

Participants are expected to leverage MEST’s partner network as a part of their learning experience. They are given the opportunity to do so with more than 30 organizations, including potential investors and leaders in the technology sector who provide mentorship and help foster growth of African start-ups.

Employment Process

MEST aims to create a group of future employers who will start their own companies and contribute to the growth of Africa’s digital sector. It supports this vision with a full-time, on-the-ground team of business advisors and experts to

assist with application development, marketing, sales and distribution for start-ups.

Types of employment opportunities available to MEST alumni:

1. Graduates are given the opportunity to pitch business ideas to a board of investors so they can obtain seed funding.
2. Some entrepreneurs use their business skills and experience to seek employment opportunities in professional services such as consulting.
3. MEST often gets experts from large software companies, such as like Facebook, Microsoft, and Uber, who offer career opportunities to the most technologically adept students.

Employer Perspectives

MEST graduates are highly employable. They have robust technical skills and a breadth of cross-cultural experience that is gained by working with people from diverse backgrounds. MEST has trained nearly 300 entrepreneurs since it began and brought in over 80 international fellows and mentors to help train African youth.

Economic Impact

MEST has invested \$15 million in over 50 early-stage software companies, from e-commerce and consumer

Internet to agrotech, fintech, healthcare IT, and digital media. These companies have created more than 400 skilled jobs in Africa. In 2008, only 10 percent of the students were female. In 2016, that had risen to 30 percent. MEST continues to promote women's participation in Africa's digital economy.

OPERATIONS

Program Evolution

Participation and Funding

MEST began with 12 students a year and has risen to 60. Its growth also led to a rise in seed funding for teams.

Program Duration

Another change is the program length. MEST began as a two-year program and switched to a one-year program, with less classroom time in favor of practical exposure. This allows students to begin building their businesses sooner. MEST started accepting applications from Nigeria in 2015 and soon after expanded to Kenya and South Africa. In 2018, Côte d'Ivoire became the fourth market for applicants, making the program truly pan-African.

Applications

The growing popularity of MEST has helped attract international applicants. In 2018, the program received over 2,500 applications. About 1,000 made it past the initial filter. Many of these applications came from non-target markets including Tunisia, Somalia, Sierra Leone, and Tanzania. The program currently has participants from 12 to 14 different nationalities.

MEST recently launched a partnership with non-profit STEMbees, founded by MEST alumni, to increase the number of female students. The partnership is aimed at providing mentorship to young women looking to pursue careers in science and technology fields.

Incubator

The MEST Incubator—which provides seed funding, working

space, and hands-on support for start-ups—also has been growing in size. The flagship incubator is located in Accra, Ghana. A satellite space opened in Lagos in 2016 and Cape Town in 2017. MEST plans to open a new incubator in Nairobi soon.

Path to Scalability

MEST has reached many applicants through digital advertising and online communities. As the program is focused on technology, an online medium is a fitting method for marketing. MEST also has leveraged partnerships to increase its reach within Africa. Its partnership with Moringa School, a digital and professional skills learning accelerator, provides students with a 15-week coding boot camp and career placement services.

STUDENT EXPERIENCE

John Muchiri is a 2017 graduate of MEST. He and two other graduates cofounded Nestmetric, a company based in Kenya using real-time artificial intelligence, with the support of the MEST Incubator.

Overall Experience: Diversity is the key to this program. Students come from many different countries and bring a variety of ideas, ambitions, and work styles. This diversity helps contribute to a unique learning experience.

Application Process: The multiple stages of the application process, particularly the aptitude test and one-on-one interview, make it tough. This difficulty ensures quality students who are top performers in their countries.

Program Approach

"The true value of the program really depends on what your experience has been coming in. I had programming experience, so didn't really need that training, though a lot of people did. I found the quarterly capstone projects very useful as we had to go out and try to get customers for our businesses. Entrepreneurship is so practical, so this element of practical learning was useful."

– John Muchiri, Cofounder, Nestmetric

Program Impact

John dreamed of starting a global company. MEST equipped him with the necessary skills, resources, and alumni network to help accomplish it.

Reflections

What were the key reasons for selecting this program?

After starting a number of local companies, John wanted to create a global company with a large impact on the community. MEST aligned with his ambitions and had the track record of seeding many such companies.

How did the program help you to achieve these goals?

MEST attracts people from around the world to give guest lectures and mentorship sessions, John said. These experts include chief operations officers of large Silicon Valley companies, such as Facebook, as well as investors and industry leaders. Their interactions with students are very impactful. The alumni network is also a source of inspiration. Discussions with them about their own challenges and approaches are helpful for entrepreneurs-in-training.

What advice or suggestions do you have for the program?

John believes it's important for these programs to have as much practical application as possible. He explained that trainers should have real experience in what they are teaching, as this gives participants real insight into the challenges of developing a certain program or selling to particular customers.

John said MEST is ideal for students who can come up with good ideas, but that is not always easy. Programs should ensure they assist participants during the idea generation phase. One way to do that, he said, would be to let them work on existing ventures within the incubator before they launch into their own idea generation process.

What advice or suggestions do you have for applicants?

John believes applicants should have a fixed goal in mind and be clear on what their ambitions are in order to make full use of the program. He said applicants without a clear goal often find it hard to cope with the intensity of the program. For those who have a clear objective, he believes MEST is effective in providing the training, support, and networks needed to achieve it.



John Muchiri, Co-founder of Nestmetric

- John is the co-founder of Nestmetric, a customer retention platform for Software as a Service companies that use AI to predict customer behavior.
- He entered MEST in 2016 as a student, having dropped out of a bachelor's of science in computer science. John found the process of pursuing a degree and working on a business at the same time difficult, and enrolled in MEST to help launch a global start up.
- Nestmetric was founded by John along with two fellow students. The company was finally launched in 2018 with initial funding from MEST. MEST had been instrumental in inspiring them to come up with ideas to solve community problems and helped provide the resources required to start a global company.

Student Background

KEY PEOPLE



Aaron Fu
Managing Director,
MEST

Aaron Fu is an early stage investor, and has 4 years of experience focused on innovation in Africa, working across diverse industries from financial services to agriculture. He manages a portfolio of 30+ startups spanning industry groups including fintech, media, eCommerce and agritech.



Tobi Lafinhan
Recruitment Manager,
MEST

Tobi Lafinhan is a civil engineer with experience working for leading organizations in West Africa. He currently leads MEST Africa's regional participant search, while also supporting international marketing and recruitment for teaching fellows.



Ashwin Ravichandran
Director, Portfolio Support,
MEST

Ashwin is an Interactive Designer/Developer, specializing in user experience and user interface and product growth. He has a bachelor's degree in Computer Science. In July 2015, he began as a tech fellow at MEST in Accra, Ghana working with 60 entrepreneurs on how to build sustainable tech

startups. He now leads the MEST Incubator in Ghana and manages the overall startup portfolio across Africa.



Kamil Nabong
Entrepreneur-in-Residence,
MEST

Kamil has a background in law and economics. A MEST graduate, he co-founded Dropifi in 2011 to help online merchants engage with customers in a better way. Dropifi was the winner of Kaufman Foundation's Startup Open in 2012 and later became the first African startup accepted into 500 Startups in Silicon Valley.



Vo Jackson
Director, Community,
MEST

Vo was born in Kwazulu-Natal and moved to Cape Town in 2001 to study medical psychology and social work at the University of Cape Town. After her studies she spent a year traveling India, Nepal and Thailand before returning to Cape Town as a marketing manager for a local luxury restaurant group. Shortly after, the entrepreneur bug bit and she set off on her own pursuits, starting seven various ventures. Today she is responsible for MEST South Africa and leads the pan-African team of community managers.

Microsoft 4Afrika



Photo © Microsoft 4Africa



Program Type

Internship; Apprenticeship and Online programs



Medium of Delivery

Combination of in-classroom, online and on-the-job training



Program Duration

3-6 months for Interns4Africa and the AppFactories



Annual Participants

~500 (AppFactories); ~250 (Interns4Africa)



Organization Type

Corporate supported



Year Established

2013



Average Fees per Participant

Free



Number of Alumni

~1,400 (AppFactory); ~530 (Interns4Africa)



Geographic Coverage

Across Africa on ground presence in Nigeria, Ghana, South Africa, Egypt, Uganda, Kenya, Rwanda, Mauritius, Malawi and Ethiopia.



COMPANY OVERVIEW

4Afrika is a Microsoft initiative focused on improving digital access and supporting innovation in Africa. The organization's Interns4Afrika program leverages Microsoft's partner network across the continent and combines rich in-classroom and virtual training with real-world work experience through internships.

For more information, visit:

<https://www.microsoft.com/africa/4afrika/>

Mission Statement

To enable Microsoft's global mission in Africa, empowering every person and organization with the access, skills and opportunities for innovation to help Africa achieve its true potential and lead the technology revolution.

“The program was created to take a hands-on approach, through which we supplement students’ theoretical knowledge with practical experience, real-world projects, and also soft skills development, things that they need to be effective in the modern workplace.”

– Ryno Rijnsburger, Chief Technology Officer, Microsoft4Afrika

Key Innovations

Interns4Afrika has five distinct program characteristics:

1. Interns4Afrika helps address two challenges in Africa: high youth unemployment and the shortage of talented IT employees.
2. Microsoft partner organizations are able to hire Microsoft-certified interns and receive recruitment and training support from Microsoft.
3. A peer-learning approach allows more experienced learners to guide novices.
4. Virtual classroom training is used to address skills gaps at the beginning of each program.
5. Microsoft's deep partner network provides internship opportunities that are beneficial for participants and placement organizations.

Program Overview

4Afrika is a Microsoft initiative focused on accelerating Africa's economic development by providing affordable access to the Internet, creating skilled workforces, and investing in local technology solutions. This case study focuses on two employment-oriented, youth-focused internship and apprenticeship programs: Interns4Afrika and AppFactory.

But 4Afrika also offers three other programs: Virtual Academy, an online platform for digital skills training, as well as MySkills4Afrika and PopUp Lab, two programs designed to support and mentor Microsoft partner organizations. The Microsoft Virtual Academy has reached more than 1.6 million people across the continent. Interns4Afrika and AppFactory have led to employment for more than 1,600 graduates.

Program History

Microsoft4Afrika's skills development program was established in 2013 to bridge the gap between post-secondary education institutions and the labor market. Microsoft started investing in partnerships, start-ups, and

youth across the continent with the goal of fueling economic development and enhancing digital skills. The program embraces cloud technology to support productivity, inclusion, and digital transformation.

Types of Digital Skills Imparted

Interns4Afrika programs focus on intermediate and advanced digital skills. Intermediate skills in the Virtual Academy and Interns4Afrika programs include:

1. Social media marketing
2. Cloud-based collaboration
3. Data platform management

Advanced skills in AppFactory and include:

1. Coding and software development
2. Building and managing enterprise, mobile, web and IoT apps

Business Model

The 4Afrika initiative functions as a market and ecosystem development engine for Microsoft. The company, through 4Africa, seeks to invest in the continent's technology ecosystem, develop talent and increase the skilled workforce. This allows Microsoft to access the market as both a source of talent and customers.

Interns4Afrika and AppFactory are supported financially and operationally by organizations within Microsoft's partner network in Africa. These groups benefit from their participation as they gain access to a pipeline of IT talent.

Microsoft benefits from this training as it builds literacy in Microsoft tools and platforms. This drives the ongoing consumption of Microsoft products and solutions, such as the Azure cloud computing service.

PROGRAM OFFERING AND TARGET PARTICIPANTS

Program Offering

4Afrika's approach to skills development uses a blended-learning approach that combines in-classroom activities with virtual learning and on-the-job training.

4Afrika runs Microsoft Virtual Academy 4Afrika, a cloud-based learning platform that makes digital skills training more accessible and convenient for people across the continent. The organization also runs programs designed to help local companies that want to use technology solutions to advance and grow their business. MySkills4Afrika and PopUp Lab are programs aimed at giving organizations access to Microsoft experts who can provide mentorship and networking.

The initiative's two employment-focused digital skills training programs are:

1. **Interns4Afrika:** Interns4Afrika targets unemployed and underemployed youth across Africa and helps them gain skills through on-the-job training with a Microsoft partner organization. Participants are placed in one of these companies for three to six months and choose between a training path in marketing, sales or technical skills. At the end of the program, interns are trained for the job and often are evaluated for a role with the host organization.
2. **The AppFactory:** AppFactory operates across 18 academies and targets recent IT graduates who can benefit from hands-on software development experience. Participants work alongside senior software engineers on real-world projects and develop practical digital skills over a six-month period. This program acts as a bridge between traditional post-secondary education and practical industry needs.



Photo © Microsoft. 4Afrika

Target Participants

Microsoft recognizes the huge untapped potential of youth in Africa. Its training initiatives aim to address the shortage of digitally-skilled workers across the continent. Employers in Africa say that finding skilled workers is a major constraint to their growth. Technological advancements and the changing job landscape are widening this gap. 4Afrika aims to reduce it through industry-linked training programs.

Many African youth are graduating with degrees that do not adequately prepare them for the needs of the modern workplace. 4Afrika gives participants the opportunity to develop in-demand technical and soft skills through a blended-learning and internship experience. Most participants can expect to leave these programs with a job at a Microsoft partner organization or are able to secure one within three months of graduating.

4Afrika's skills development programs target Africans ages 18 to 35 who are looking to develop modern technical skills and advance their careers. Interns4Afrika and the AppFactory require applicants to be pursuing higher education or to have completed an undergraduate or postgraduate course in business-related or IT fields within the past year. AppFactory is primarily geared towards IT graduates.

4Afrika reaches out to potential participants through online and social media marketing efforts, online jobs boards such as Fuzu, Microsoft partner organizations, and affiliate universities across Africa.

Key Challenges and Solutions

The program faces a dearth of sufficient office space and resources at partner organizations in Africa, as well as qualified mentors for program participants. Microsoft has attempted to mitigate this by expanding its network of partners and moving towards a peer-to-peer learning approach within its AppFactory.

Program organizers also have found it difficult to overcome language barriers. 4Afrika programs are provided in English and therefore have been unable to expand into the French-speaking regions of Africa. 4Afrika is planning to address this by developing its programs in other languages, including French.

Adapting to constantly changing employment requirements and new technologies is a further challenge. Microsoft uses its partners to identify employer needs and new advancements for which skills training is required.

INTERNS4AFRIKA

Program Overview

Interns4Afrika was launched in collaboration with Microsoft's partners in Africa to build a Microsoft-certified talent pipeline. The program places students and recent graduates in a six-month internship and provides digital skills training through applied work experience.

Interns4Afrika is active in around 150 partner organizations across 21 African countries, with about 80 positions awarded twice a year in February and June.



Photo © Microsoft. 4Africa

Pre-program Activities

Microsoft recruits and integrates partner organizations as well as participants for the program. Companies interested in joining the Interns4Afrika program apply to host interns. They specify their requirements for interns, including which intake cycle they are recruiting for and the number needed.

Microsoft is open to partners from within the network as well as external partners who are able to provide a suitable environment and essential resources for interns. The ability to pay stipends and provide hardware are key considerations for Microsoft when selecting partner organizations.

Application and Selection

The Interns4Afrika program is highly selective. Participants apply through the Microsoft application portal (Nigeria receives almost 500 applicants a cycle). Microsoft reviews the applications and around 50 make it to the phone interview stage. Only about 15 of these 50 applicants are invited to interview with the host partner organizations for a final round. From these, roughly five are selected as interns.

Program Approach and Format

Microsoft partner organizations recruit participants locally and place them in sales, marketing or technical support roles with a high information and communication technology

focus for six months. Interns work in a virtual classroom for the first three months of their internship. The virtual training includes self-study as well as teacher-led instruction. The training aims to equip participants with the necessary skills for their upcoming roles. Except for the first three months, monthly training sessions take place throughout the internship to ensure continued professional development.

Interns are provided a monthly stipend and accommodation by the partner organization. They work on ongoing projects within the company and learn through collaboration with colleagues. Internships are structured into three ICT intensive paths for students to choose from: marketing, sales, and technical.

1. Sales: This path trains interns how to use digital tools, such as customer relationship management systems to improve customer management and drive sales.
2. Marketing: This track explores methods of using technology to engage with customers in new ways, including social media marketing campaigns. It also includes development and execution of marketing plans.
3. Technical: The technical path helps interns develop skills on specific Microsoft tools, including:
 - a. Azure—a building and managing enterprise for mobile, web and Internet of things apps

- b. Office 365—a platform for cloud-based collaboration and productivity tools
- c. Data platform—a variety of solutions for using data and insights to improve customer value and operational experience

Following the initial training, interns also are given an opportunity to take the exams needed to earn Microsoft Certification. This certification is highly valued by Microsoft partner organizations and enhances student employability.

Key Innovations

Interns4Afrika helps address two challenges in Africa. The first is high youth unemployment and the second is the shortage of talented IT employees across the continent:

1. Partner organizations are able to hire Microsoft-certified interns, with Microsoft providing the recruitment and training support.
2. Mentorship from partner organizations, combined with virtual classroom training at the beginning of each program, has proven to be an effective model for closing the skills gap in today's industries. Companies are expected to play a role in training and mentoring young talent and are supported by Microsoft's network and expertise.

THE APPFACTORY

Program Overview

Microsoft recognizes public and private sector organizations across Africa are finding it difficult to recruit capable software engineers. As a result, they often import technology solutions that do not adequately capture local realities. At the same time, thousands of local information technology graduates are either unemployed or underemployed due to a mismatch between the skills taught in university and those required by technology companies.

The AppFactory bridges the competency gap for local graduates, giving them much-needed skills training in industry-directed areas so they are able to get jobs.

The first Microsoft AppFactory was launched in 2013 in South Africa, through a partnership with the Johannesburg Centre for Software Engineering. It provided interns with a paid internship at the TechnBraam start-up incubator space in Braamfontein.

There are currently 18 AppFactory academies operating in African countries, including Nigeria, Ghana, South Africa, Egypt, Uganda, Kenya, Rwanda, Mauritius, Malawi, Botswana and Ethiopia.

Scale-up Model

A major innovation in 4Afrika's AppFactory program is its franchise model, which has helped expand operations across the continent. AppFactory is set up in collaboration with public and private sector partners through the following process:

1. An AppFactory "host" provides the physical space and training resources for the center. This is often a partner university or IT company with an interest in building the pool of tech talent in the country, such as the United States International University Africa in Kenya.
2. AppFactory partners, often local corporations, contribute resources and projects for participants to complete. Tulane University, in partnership with AppFactory, has apprentice developers working on extending software applications in Tulane's eHealth suite.
3. Microsoft provides an operational blueprint, professional networks, training resources, and the digital tools required for software development.

Application and Selection

Interested participants submit an online application to an AppFactory. Applicants are selected based on aptitude tests as well as personal interviews. Incoming participants are required to have basic coding proficiency.

Program Approach and Format

AppFactory university or technology company partners design projects for participants to work on throughout the program. Apprentice developers then spend six months working with senior Microsoft software technicians and partner organizations to develop the project and learn essential workplace skills. The AppFactory goal is to enhance a participant's theoretical IT learning experience through real-life applications. Cloud computing, secure coding, data analytics, and machine learning are among the digital skills students learn throughout the program.

Program Highlight

Malawi AppFactory in Collaboration with UNHCR

4Afrika opened an AppFactory in 2017 with the United Nations High Commissioner for Refugees at Dzaleka, the largest refugee camp in Malawi. Microsoft 4Afrika provided Wi-Fi connectivity throughout the settlement with the support of local Internet service providers for a year. It also provided 1000 smartphones, 40 laptops, and 10 tablets to students.

The program selected 31 students based on a highly competitive aptitude test for the first AppFactory program. Microsoft designed a foundational program since students had very little opportunity for post-secondary education. The six-month program taught basic digital literacy and intermediate software skills to give participants the prerequisite skills needed to participate in the AppFactory program.

Participants of the Malawi AppFactory program have developed technology solutions that range from an information app for new arrivals to one that manages schedules for allocation of food.

IMPACT

Learning Goals

4Afrika programs have helped African youth develop intermediate and advanced digital skills as well as soft skills and experience working in a team.

Interns4Afrika offers its participants three digital skills paths to choose from:

1. The marketing and sales paths focus on soft skills and team work as well as some basic and intermediate technical skills such as word processing social media marketing, and communication strategies.
2. The technical path teaches skills such as data platform management, building and managing apps, and cloud computing.

AppFactory focuses on advanced programming and development skills to help graduates independently develop applications and other technology solutions.

Links to Industry

Microsoft has an extensive partner network of some 1,200 organizations in Africa, including established businesses as well as start-ups in retail, energy, IT solutions, and cloud computing. These partner organizations host interns and offer those who are successful permanent roles in their companies. They also recruit alumni from other 4Afrika skills programs. Microsoft provides mentorship and support to its partners as a part of the MySkills4Afrika programs, which helps to further build and expand their partner and alumni network.

Employment Process

Interns4Afrika gives participants the opportunity to work at one of 150 partner organizations across Africa. After the program, about 90 percent of these participants find jobs outside or with the host organizations.

AppFactory helps connect and place its graduates by leveraging partner organizations. Around 85 percent of AppFactory graduates have secured employment within three months of graduating.

4Afrika also uses its alumni network to provide graduates of the Interns4Afrika and AppFactory programs with a platform to connect with additional starts-ups and tech firms. Alumni offer mentorship and networking opportunities to participants.

Employer Perspectives

Microsoft partner organizations benefit from hiring recruits who are closely linked to the Microsoft ecosystem. These participants are trained with the latest technology solutions and receive Microsoft certification. For Microsoft's smaller partners, the ability to hire pre-trained staff helps add talented employees quickly. Employers have found the

recruits from the Interns4Afrika and AppFactory programs bring fresh thought into the organization and help them develop a stronger relationship with Microsoft.

Impact

4Afrika has helped individuals and organizations across Africa learn new skills and become better prepared for the digital future of jobs. About 1.6 million people have received training through Virtual Academy 4Afrika, and more than 1,500 partner organizations have been trained in virtual classrooms.

Interns4Afrika has taught over 530 interns, 450 of whom were recruited by their host organizations after their internship. More than 1,400 apprentices have graduated from the AppFactories, 1,200 of which found jobs within three months of graduating. Microsoft 4Afrika also has provided one-on-one mentorship and technical support to

Learner Experience



Gilbert Ngetich, Interns4Afrika alumni

- Ngetich interned at M2M Systems in Nairobi, Kenya and now works as a Cloud Engineer at M2M
- Ngetich's brother suggested him for an internship through the 4Afrika program, as he had a strong work ethic but suffered some financial challenges
- Ngetich completed a six month internship, developing cloud computing solutions on the Microsoft Azure platform. In this role, he was able to develop technical, communication and problem solving skills
- Ngetich joined M2M as a full time Cloud engineer and has had the opportunity to participate in the 'Microsoft Inspire' partner conference in Washington D.C. This conference provides the opportunity to learn, network and form new business contacts
- The Interns4Afrika internship helped Ngetich develop digital and career skills in a real work setting, and has given him the confidence to advance his career
- Ngetich is now looking to pursue a postgraduate program in a United States university

(Profile from 4Afrika website)

82 start-ups and helped fund 65 start-ups that have since generated \$5.1 million in reciprocal investments.

OPERATIONS

Program Evolution

The 4Afrika skills development programs were launched with the goal of developing a workforce that could bridge the technical skills gap for Microsoft partners and other organizations across Africa.

The program has evolved over time and now measures its success by its alignment to Microsoft's cloud-growth strategy as well as its African partners' access to talented employees training.

The Interns4Afrika program was launched in 2014 as an extension of Microsoft's internship program, which focused on placing interns into the company's Africa offices. The program started with three streams and has evolved to include new training roles such as Azure and data platform management.

The AppFactory program has shifted from a focus on software craftsmanship and Microsoft tools to other requirements of the modern workplace such as cybersecurity, artificial intelligence and big data. The program also trains students on open source platforms such as Python. The franchise-like model now allows private or government organizations to set up AppFactories with the support of Microsoft's detailed operational blueprint, learning resources, and partner network.

Path to Scalability

Microsoft4Afrika is constantly evolving to increase its impact and reach more learners. As the AppFactory program expands throughout Africa, program designers are looking to refine the standardized template so that local partners and instructors can set up an AppFactory quickly and efficiently.

Interns4Afrika hopes to grow by broadening the candidate eligibility criteria. The program wants to include candidates who may not have college degrees but have the relevant soft skills and drive to succeed in the program. By providing them with the right training, these candidates will gain the opportunity to flourish in their jobs.

Interns4Afrika also plans to expand its partner network through marketing channels and offer the program in different languages, including French, to reach a wider range of African students.

KEY PEOPLE



Amrote Abdella

*Director of
Microsoft4Afrika*

Abdella holds a bachelor's in political science from Davidson College in North Carolina, and an master's in international economics development from Brandeis University in Massachusetts. Prior to joining Microsoft, Abdella worked for, among others, the World Economic Forum, the World Bank, the Global Hunger project and the Grameen Foundation. She has focused on financial services, policy guidance and economic development for Africa. Abdella has been the Regional Director of Microsoft 4Afrika Initiatives since 2013.

Udacity



Photo © Udacity



Program Type
Nanodegree program



Medium of Delivery
Online courses



Program Duration
4-6 months
(Nanodegree program)



Annual Participants
70,000 in Nanodegree programs



Organization Type
For-profit



Year Established
2011



Average Fees per Participant
USD 1,000 per
Nanodegree program



Number of Alumni
70,000 for Nanodegree programs



Geographic Coverage

Present in 190 countries, except in countries with OFAC restrictions.



COMPANY OVERVIEW

Udacity is a for-profit MOOC provider that teaches industry-relevant programming skills and offers credentials endorsed by leading technology providers. Udacity courses give students the opportunity to learn advanced digital skills at a significantly lower cost and time period compared to traditional universities.

For more information, visit: <https://in.udacity.com/>

Mission statement

To democratize education by offering world-class higher education opportunities that are accessible, flexible, and economical.

“We never start anything out of academic interest, we always start from the job and from the work and from the requirements”

– Vice President of Learning, Udacity

Key Innovations

Udacity has developed features that differentiate it from other similar providers:

1. **Program Delivery:** Udacity programs are delivered through short courses and students are assessed through projects instead of examinations.
2. **Employment-focused Program Provision:** Udacity programs are geared towards job-readiness through strong career support and hiring partnerships with more than 200 companies that seek to recruit Nanodegree graduates.
3. **Unique Program Offering:** Udacity offers several high-profile courses that aren't offered by other online providers or traditional universities, such as artificial intelligence, self-driving cars, blockchain development, robotics, and flying cars.

Program Overview

Udacity is a global online education provider that offers technical and innovative courses for students ranging from absolute beginners to experienced professionals. The company aims to help learners develop the job-ready skills they need to secure employment or advance in their careers. Udacity's Nanodegree programs give students the option to complete a defined set of courses in a particular discipline and receive a certificate valued by Udacity partners and potential employers. Udacity also offers select individual courses within the Nanodegree programs for free, although these students only get access to the content and do not receive other perks of the programs, such as the opportunity to work on projects. Individual courses offered on the platform are all free of cost. Udacity also offers paid corporate training programs.

Program History

Udacity began as an experiment in online learning when Stanford University instructors Sebastian Thrun and Peter Norvig decided to offer their introduction to artificial



Photo © Udacity

intelligence course online for free. The course quickly gained traction and received over 160,000 student registrations from more than 190 countries. After several years of intensive iteration and experimentation, they refined Udacity's focus to career advancement through mastery of in-demand skills.

Types of Digital Skills Imparted

Udacity's course offerings cover everything from entry-level programs to highly-advanced and specialized programs, including:

1. Machine learning
2. Deep learning
3. Artificial intelligence
4. Computer vision
5. Autonomous systems
6. Virtual reality
7. Web development
8. Mobile app development
9. Data science

10. Data analytics
11. Digital marketing
12. Cybersecurity

Business Model

Udacity is designed to be highly accessible through its web-based delivery. It maintains an industry-relevant curriculum developed with hiring partners. Udacity's program offerings can be used with select local partnerships to provide more targeted content. Industry-relevant curriculum that helps ensure future employment is vital in attracting learners to sign up for programs.

Udacity's revenue reached \$70 million in 2017. The company has raised \$160 million in four rounds of funding led by Bertelsmann and Andreessen Horowitz and other private equity firms. Udacity's revenue streams include its consumers, business enterprises, government and nonprofit customers, and hiring partners.

Fees vary based on course, program, and location. Nanodegree programs in the United States typically cost \$999. Udacity has launched more than 15 scholarship programs since 2017 in partnership with Google, Lyft, AT&T, Facebook and other corporations that have benefited over 200,000 students from more than 150 countries.

PARTICIPANT SOURCING AND SELECTION

Target Segment and Pipeline Development

Udacity identified a large skill gap in advanced digital skills throughout the workforce. The company's founders anticipated that future technology jobs would require these skills and created a platform to help individuals gain the necessary expertise. The program focuses on building job-relevant skills from the first day through projects-based learning that emphasizes use in the real world. These are evaluated by experts in the technology industry.



Photo © Udacity

Udacity's Nanodegree programs are open to all learners except for the advanced programs. These have specific prerequisites to ensure the right fit and prevent drop-outs. The program targets students of various ages and educational backgrounds who are looking to develop technical skills to advance their career path. The majority of students are early to mid-career professionals from 24 to 35 years old. Early-career professionals often are looking to launch a new occupation in technology, while mid-to-late career professionals seek to enhance their skills within their current professions.

The majority of Udacity Nanodegree applicants first interact with the program by testing the content's free courses. Some students hear about the program through partner companies that help develop its course curriculum. Udacity also reaches out to companies directly to make them aware of its capabilities in advancing the skills of existing employees.

Application and Selection

Application Format

Most programs do not have a full application process. Applicants pay for a program and are granted admission immediately. The process differs for highly advanced courses, such as the self-driving car engineer program, where candidates must answer questions that test for a prerequisite skill levels and explain how the program is expected to benefit them. Individuals applying for scholarships must also fill out applications with similar questions. Applications are reviewed by the curriculum team responsible for the specific program's development. A team is designated to review scholarship applications.

Lead Time from Application to Program Start

Students in free, individual courses can access course materials immediately after signing up. Nanodegrees are term-based with each term lasting three to four months. The duration of Nanodegrees is typically one or two terms, with new cohorts starting every month.

Key Challenges and Solutions

Udacity has struggled to ensure students have enough prerequisite knowledge and technical ability to join advanced programs. Udacity addresses this challenge by categorizing programs into levels, such as entry-level or advanced. Advanced programs have clear qualifications and prerequisites that are tested as a part of the admissions process. Directing applicants to the right programs doubles as a retention strategy.

PROGRAM EXPERIENCE

Program Approach

Udacity creates its course content in partnership with leading industry experts so it is highly relevant within the technology sector. This makes program graduates more attractive for recruiters.

The standard program duration for free courses is between two weeks and four months. Some of these courses are self-paced, allowing students to complete lessons at their own pace. The Nanodegree programs are typically six to eight months and split into two terms. They have a pre-set timeline that applicants are required to follow.

Program material is provided exclusively online, comprising instructional videos and interactive online assignments. Students participate in project labs where they develop skills through complex projects that are built into the program and evaluated by experts in that field. They also have access to real-time online mentorship from Udacity staff. Experts in their network check in on a regular basis to keep students on track and provide technical skill support. Students may reach out to their mentors through the Udacity web platform. They also can use the platform to ask questions to peers or staff.

While Udacity is primarily an online platform, it has ventured into blended offerings for some programs. Team members in California, for example, developed the Udacity Connect initiative within the Nanodegree course. Udacity Connect requires the course instructor to meet with the cohort once

a week to conduct a workshop. It is offered in Cairo, Dubai, Saudi Arabia, and India.

Instructors

Program instructors have significant industry experience and most often are involved in the development of program content. The instructor selection process requires candidates to fill out an application form and complete a technical challenge to verify they have required skills.

Program Evolution

When Udacity was established in 2011, initial completion rates for its free courses were below 10 percent. The team altered its strategy and began offering paid online courses linked to strengthening employment options, using guidance from industry experts. The program has expanded to deliver more diverse, applied, hands-on coding instruction on the online-classroom platform, compared to the basic coding exercises and evaluations conducted earlier.

A core structural feature of the program is the emphasis on short instructional videos. The program has evolved to offer more modular content that is frequently updated to incorporate new technology learning. The program code is kept self-contained to allow for easy upgrades to programming language and the replacement of individual components.

Udacity has partnered with universities such as San Jose University and the Georgia Institute of Technology, as well as leading technology companies such as Google, to launch well-regarded Nanodegree programs recognized by employers. It has become part of employment initiatives that bring in over 200 hiring partners and career support to help students land their dream jobs. Making career support an incentive has helped increase pass rates beyond 50 people in some Nanodegree programs.

Udacity witnessed a growing demand in 2017 for its enterprise services. These include helping businesses meet their growing needs for tech-savvy workers by training their employees and job candidates.

PROGRAM IMPACT

Udacity offers industry-relevant curriculum and effective career support to Nanodegree graduates, making the program attractive to both students and employers. Nanodegree graduates in the United States and Canada have reported average salary increases of 38 percent through their new jobs.

Learning Goals

Skills taught within the program vary by field and include software development, business and data analytics, data science, social media analytics, artificial intelligence, and machine learning. Udacity also teaches more niche courses such as cybersecurity, driverless cars, robotics, and virtual reality. Course training includes:

1. **Immersive Curriculum:** This curriculum focuses on hands-on learning, interactive content, and measurable progress.
2. **Supported Journey:** Students are provided with experienced mentors throughout the course, along with expert reviewers, and an engaged and dynamic student community.
3. **Real-world Projects:** Students are required to work on projects designed by industry experts, given actionable feedback by industry participants, and are trained to produce portfolio-ready results.
4. **Links to Industry:** Udacity's curriculum is built in collaboration with the world's most innovative organizations. Udacity works with over 100 global companies and ensures that its course content is relevant for meeting today's industry needs.

Employment Process

Students enrolled in Nanodegree programs benefit from personalized career support and assistance in accessing employment opportunities. Their career support training includes:

1. Resume feedback with an expert review on how to market oneself
2. Mock interview experience to practice behavioral and technical questions
3. Exposure to potential employers through Udacity's global talent program
4. Networking opportunities with Udacity alumni through forums and meetups

Students may apply to job openings on Udacity's career portal that lists exclusive opportunities at partner organizations. Udacity works closely with more than 200 partners including AT&T, BMW, Didi Chuxing, IBM Watson, Mercedes, NVIDIA, Samsung, SAP, and Uber. Nanodegree graduates benefit from fast-tracked consideration for open roles at partner companies, giving them a distinct advantage during their job search.

Learner Perspectives

"Udacity helped me to accomplish a complete life-altering career change from TV personality to Android Developer at eBay!"
– Working at eBay

"Soon after completing Udacity's Intro to Programming Nanodegree program, I was able to start a new career in technology with AT&T."
– Working at AT&T

"I was a teacher before I studied with Udacity. My studies helped me get accepted in a competitive bootcamp, which eventually led to a job at Amazon."
– Working at Amazon Web Services

Employer Perspectives

"We've been blown away by the caliber of students we've seen from Udacity's existing Nanodegree programs, and we're looking forward to meeting this new generation of robotics engineers."

– Director of Engineering, Uber ATG

"We're proud to partner with Udacity on the Robotics Nanodegree program to hire the brightest minds who will help us create the brightest future."

– Vice President, Engineering and Technology,
Lockheed Martin

"We are excited to partner with Udacity to get access to a global pipeline of talented individuals prepared to kick off a career in digital marketing."

– Employer Branding, Zalando

OPERATIONS

Path to Scalability

Udacity has grown tremendously since it launched in 2011. The company's online delivery channel has made it possible to deliver courses in more than 190 countries. It has acquired students through partnerships with technology firms. Its up-to-date content helps attract individuals who want to apply their learning to real-life workforce needs. It has been able to quickly update and build on courses by keeping its curriculum content as modular as possible. Udacity is currently using online marketing channels to increase its reach and grow its student base.

KEY PEOPLE



Sebastian Thrun
Founder, President &
Executive Chairman

Sebastian Thrun is a scientist, educator, inventor, and entrepreneur. He is also the founder of Google X, where he led projects including the self-driving car and Google glass. Previously, he led the Stanford Racing Team whose robot, "Stanley", won the DARPA Grand Challenge. Sebastian has been named the fifth Most Creative Person in Business (Fast Company), among the 50 Smartest People in Tech (Fortune), and highlighted in 50 Best Inventions of 2010 (Time). He is the first recipient of the inaugural Smithsonian American Ingenuity Award for Education.


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- 179 L.E.K. interview with HR Manager, manufacturing company in Ghana.
- 180 L.E.K. interview with HR Manager, construction company in Ghana.
- 181 L.E.K. interview with Store manager, supermarket chain in Ghana.
- 182 L.E.K. interview with Head of HR, leading media company, Ghana.
- 183 Ibid.
- 184 L.E.K. interview with Dean, engineering college in Ghana.
- 185 L.E.K. interview with participants from retail, accommodation and food, education and media services.



186 L.E.K. interview with HR Manager, logistics company in Ghana.

187 L.E.K. interview with Recruitment Officer, airlines Company in Ghana.

188 L.E.K. interview with Head of HR, bank in Ghana.

189 Ibid.

190 L.E.K. interview with Director, educational institute in Ghana.

191 IFC Global Digital Skills Survey, October-November 2018.

192 Responses are aggregates of survey data and do not add up to 100%.

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CONTACT INFORMATION

Elena Sterlin

Global Head
Health and Education
esterlin@ifc.org

Tania Lozansky

Global Head of Advisory
Manufacturing, Agribusiness
and Services
tlozansky@ifc.org

Salah-Eddine Kandri

Global Lead, Education
Health and Education
skandri@ifc.org

Alejandro Caballero

Principal Education Specialist
Health and Education
acaballero@ifc.org



Creating Markets, Creating Opportunities

2121 Pennsylvania Avenue, NW
Washington, DC 20433 USA