CHAPTER 4

Building technical knowledge and skills

Economic transformation demands a healthy workforce equipped with the knowledge and skills to be highly productive in the workplace and to generate innovations in technologies, processes, products, and services. As chapter 3 shows, Sub-Saharan Africa will, by 2050, be among the regions with the largest and youngest labor force in the world. This young and growing workforce can be a global competitive advantage and a great asset in driving economic transformation—if it is healthy and has the right skills. Or it could be a drag on growth and a threat to social and political stability. This chapter discusses approaches that Sub-Saharan countries may use to upgrade the skills of their labor force to drive economic transformation.

The challenge of quality

Sub-Saharan Africa has made good progress in the past two decades providing access to primary education and is now close to other regions in gross enrollments. But at the secondary and tertiary levels it lags far behind. And quality is a challenge at all levels. At the secondary and tertiary levels there is inadequate emphasis on the science, technology, engineering, and mathematics (STEM) needed for today’s technologically oriented global economy. Nor is there enough attention to technical and vocational education and training (TVET) and to links with business. The results: although only a small fraction of the population has attained secondary and tertiary education, the region faces a growing problem of educated but unemployed youth—reflecting challenges on both the supply and demand sides of skills.

Primary education

Primary enrollments have expanded significantly in the past two decades, to the point where the region is now almost at par with other regions. While this progress is welcome, completion rates are still low—at around 70%, compared with 100% in the comparator countries, but up from 52% in 1970.

Quality is also low. International tests monitoring primary education quality include the Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ), the Programme d’Analyse des Systèmes Éducatifs de la CONFEMEN (PASEC), and the Trends in International Mathematics
Early stage industrialization rests on lower and middle-level technicians produced mainly by technical and vocational institutes. The 2012 Education For All report shows that fewer than 65% of children in PASEC countries starting grade 1 reach grade 4 and achieve minimum learning in mathematics. Of the SACMEQ countries, more than 50% of the children in Kenya, Mauritius, and Swaziland reach grade 4 and achieve minimum learning. But in Lesotho, Malawi, Mozambique, Namibia, Uganda, and Zambia only about 20% do.

Secondary education

Given today’s technologies and competitive global landscape, primary education is by no means adequate. But secondary and tertiary enrollments are very low in Sub-Saharan countries (figure 4.1), with female to male rates of 82% for secondary and 63% for tertiary in 2010. Though secondary enrollments are rising, completion rates remain low (below 40% for lower secondary, compared with more than 80% in the comparator countries).

Few data are available to assess secondary quality across the continent as done at the basic education level. Some country assessments are available but are not comparable. But Botswana, Ghana, and South Africa have participated in the TIMSS at the grade 8 level (lower secondary). The three are among countries at the bottom (figure 4.2). But they should be commended for exposing themselves to international competition and for their higher aspirations.

Technical and vocational education and training

Early stage industrialization rests on lower and middle-level technicians produced mainly by technical and vocational institutes. In many countries this training takes place at the secondary level, but in some (such as Singapore) it starts after secondary education. The share of TVET students in secondary education is around 8% in Sub-Saharan Africa, far below the comparators (figure 4.3). And given the different levels of starting TVET, the differences between the Sub-Saharan and East Asian countries are even greater. In Singapore enrollments in the Institute of Technical Education and the polytechnic systems are around half of upper secondary and tertiary enrollment. And in South Korea the share of technical-vocational high schools in enrollments was around 45% in the 1970s and 1980s, 35% in the 1990s to 2000s, and 26% in 2006. Except for Mauritius, TVET enrollment shares do not match the rising aspirations to industrialize in Sub-Saharan Africa.

The quality of TVET education is also poor. Technical and vocational
trainings either is generally inserted as part of the curriculum of general secondary education, which tends to shortchange quality of both types of education, or is regarded as the option for those not good enough to make it in the academic stream. The low image of TVET and governments’ weak efforts to embed TVET in a robust transformation agenda widen its disconnect from industry and the types of technical industrial jobs that would make TVET attractive to large numbers of good and ambitious students. As a result, many TVET institutes focus on accounting, secretarial studies, and other service jobs.8

Tertiary education

Tertiary graduation rates are also low in the ACET 15 (figure 4.4). And only a small share of students are enrolled in the STEM disciplines of science, engineering, and mathematics required for economic transformation and competition in today’s technology-driven economies. The share in the ACET 15 is around half of that in the Asian comparator countries and seems to be going down.

Low demand for graduates

On the demand side it ironically appears that Sub-Saharan economies have difficulty creating employment for even the small numbers of secondary and tertiary graduates. A study of 23 Sub-Saharan countries done around 2003 found that among 25–34 year olds with higher (tertiary) education, 55% were formally employed, 20% informally employed, 26% unemployed, and 3% inactive. For those with upper secondary education only 36% were formally employed, 46% informally employed, 18% unemployed, and 8% inactive.9

In Ghana around 250,000 graduates from public and private universities
and the polytechnics currently enter the labor market annually.10 Of these graduates only about 2% (fewer than 5,000 people) are absorbed by the formal sector, leaving 98% to try to make it in the informal sector. In Ethiopia roughly 3,000 jobs in engineering, manufacturing, and construction were advertised on a website between 2007 and 2010.11 If that is any indication of the formal jobs available, only 27% of the roughly 11,000 graduates in these fields entered the labor market.12

So a region short of educated labor and trying hard to increase the supply is presiding over a large and growing number of educated but unemployed or underemployed youth.

### Options for addressing the skills challenge

**Improving quality and extending basic education**

Improving quality requires qualified, motivated teachers, and good teaching materials. As countries expanded primary schooling, they found it more difficult to attract good teachers, particularly in rural areas. And it could get worse. To achieve universal primary schooling by 2015, the region will need 4 million teachers, up from 2.4 million in 2006.13

**Producing more teachers.** One way to address the shortfall is to take unemployed college and upper secondary graduates, train them for about six months, and deploy them to schools. The initial training would be followed by periodic further training during, say, the long school breaks. Incentives should be provided to attract graduates to stay on for a set number of years or to choose teaching as their profession. That could kill two birds—providing more teachers and reducing graduate unemployment—with one stone.

Some countries now require graduates to do national service. A variant would be to offer special incentives to those electing to teach for three to five years. They could get a higher monthly allowance and state guarantees of tuition assistance for further study. Teach for America does something similar in the United States, as does Teach for All in the United Kingdom.

To encourage teachers to work in rural schools, the state could pay for communities to build modest but modern housing for them. Getting communities involved could have the added benefit of their making sure teachers do what they are supposed to do: teach during school hours.

**Producing teaching materials.** Good (and affordable) teaching materials are also important for quality. Primary students in many Sub-Saharan countries do not have textbooks they can bring home; instead, students share books that are locked up at the end of the school day. In 15 SACMEQ countries only about 40% of sixth graders had their own reading and math textbooks.14 Developing context-appropriate textbooks and streamlining their production and distribution could reduce costs and improve learning.

So could loading more African textbooks onto simple e-readers, as with Worldreader and One Laptop per Child. For two years Worldreader has been putting Amazon Kindle e-readers—and more than half a million books, many of them by Africans—in the hands of students in Ghana and Kenya. IRead students in Ghana are scoring better on reading tests. Working with biiNu, an Australia app maker, Worldreader now has its books available on low-end cellular phones, enabling access to half a million readers, many of them in Africa. One Laptop per Child claims to have delivered 2 million laptops loaded with educational software and content students across the developing world, among them Ghana, Rwanda, and Sierra Leone.

Countries should also work with their neighbors—in the Southern African Development Community and in the Economic Community of West African States, both Anglophone and Francophone—to produce common textbooks in math and science to reduce costs. Core content would be the same, with examples tailored to countries. This would require harmonizing curricula—difficult, but the payoff could be much more than lower costs. It could also lead to cross-border recognition of certificates in relevant subjects and thus promote regional skills markets.

**Building schools.** As countries make primary school universal and move to extend it to the first 9 or 10 years of basic education, the cost of building schools quickly becomes an issue. Having standard costs and construction models can help in this, as can better public procurement and project management. Cost comparisons of construction managed by education ministries, branch offices of those ministries, local governments, contractors outside government, nongovernmental organizations, and communities show that approaches closer to the ground generally have lower costs. And delegating construction management to communities produces quality classrooms at the lowest costs, about a third less than the other approaches.15 Communities contributing in kind can further reduce the burden on the state and give them the motivation to enforce accountability in schools.

**Expanding technical and vocational education and training**

Policymakers need to view TVET as essential to supporting their transformation strategies.

- Their economic policies should promote the creation of the
industrial jobs that students would train for.
- They should align the training with the jobs being created and make it a true stepping stone to good career prospects.
- They should emphasize training that provides a solid foundation in STEM and language skills for lifelong learning and skills upgrading.
- They should campaign at the highest levels to lift the image of TVET and let potential students know about the new work prospects stemming from the economic transformation strategy.

Singapore now has one of the world’s best TVET systems. But early on, people in the country looked down on it. They derided the initials for the Institute of Technical Education (ITE) as It’s The End, with no career prospects. What changed? Training that provided good job prospects, and making it possible to graduate from ITE (perhaps work for a while), and then proceed to a polytechnical institute and even to a university engineering degree. ITE no longer means it’s the end.\(^{16}\)

Policymakers in Africa could also provide incentives to favor TVET over academic education in secondary schools and universities. In the 1960s Taiwan (China) put a limit on the expansion of general academic schools and encouraged enrollment in technical and vocational secondary schools. By the 1970s, 57% of secondary students were in technical and vocational schools, and by 1990, 72%.\(^{17}\) Singapore and South Korea also narrowed the gate to academic education early on, emphasizing the technical and vocational.\(^{18}\)

Many Sub-Saharan governments may not have the central control that these three Asian countries had over education, but they still have room to maneuver.
- They can favor technical and vocational secondary and higher institutes in their expansion of public education.
- They can charge lower tuition in these institutes, as South Korea did.
- They could also subsidize tuition at private technical and vocational institutes, since governments cannot expand these institutions at the pace needed.

Chile introduced scholarships for technical and vocational students in 2000 through the Nuevo Milenio (new millennium) program and in 2006 allowed them access to guaranteed student loans. In response, at the tertiary level the share of technical institutes in first-year enrollments went from 41% in 2006 to 52% in 2011. Finland also makes technical education more attractive, lifting it to 42% of upper secondary enrollments.\(^{19}\)

Businesses have to be part of TVET for practical reasons.
- It is expensive. In Singapore officials estimate that the cost of training at a polytechnic is about the same as that for training a medical doctor. In Sub-Saharan Africa the unit costs could be up to six times those for general secondary education.\(^{20}\)
- Involving businesses in curriculum design increases the relevance to industry and motivates them to provide industrial equipment, support, and internships during training and to offer jobs on graduation.
- Businesses can also provide attachments for teachers to refresh their skills—and be a source of instructors, especially as adjuncts.
- Businesses would then be more confident that they will be able to hire people with the skills they need to make investments profitable.

Indeed, if businesses have been involved in formulating the national transformation strategy—and their investment plans are informed by that strategy—their involvement in training is one of the key ways of working with government in implementing it.

Policymakers in Africa could provide incentives to favor TVET over academic education in secondary schools and universities

Governments can also favor university enrollments in STEM. In Brazil, Chile, and South Korea public universities focus precisely on those disciplines, leaving the private sector, which provides around 70% of higher education in each country, to focus on the less expensive humanities and social sciences.

As with technical education, students majoring in STEM in public universities could pay lower tuition fees, and similarly STEM students in private universities could receive subsidies. State funding for facilities and faculties could favor such courses at public universities, and new faculty openings could be skewed toward science and technology departments in universities. The state could also offer competitive grants to private universities to steer them toward science and technology. In some cases the state might even do more to promote such education by providing grants to upgrade several private nonprofit universities rather than incurring the full expense of building a new university.

Again, behind quantity lurk quality and relevance—and behind quality are adequate numbers of qualified instructors. Vacancy rates for university faculty in Sub-Saharan Africa run 25–50%, with science and technology at the high end.\(^{21}\) To fill these slots and those opened by expanding science and technology courses will not be easy, but here are some possibilities.

First, enhance the incentives by offering research grants, lowering teaching loads, and increasing
benefits. That can help in retaining faculty. It can also attract nationals teaching or working at research institutes outside Africa. South Korea and Taiwan (China) did this to attract top scientific talent in the diaspora (box 4.1).

Second, ramp up graduate training in STEM, both at national universities and through indemnified scholarships at foreign universities. National universities should also seek partnerships with world-class universities to accept students and to send visiting professors, as Rwanda has done with Carnegie Mellon in Pittsburgh (box 4.2).

Third, encourage donors to fund training for university lecturers and, as a short-term measure, pay for visiting (and retired) professors and researchers from donor countries to teach at African universities.

Fourth, cooperate with neighbors to capture economies of scale in facilities and in lecturers and researchers. The Nelson Mandela Institute of Science and Technology, with campuses in Abuja and Arusha, and the International Institute for Water and Environmental Engineering in Ouagadougou are good examples to replicate (box 4.3). So is Rwanda’s ICT University, open to students from other African countries.

Move outside traditional systems

The number of youths who have graduated from secondary and higher institutions but are unemployed is large and growing. This problem could be turned into an advantage.

Countries should consider a skills development program outside the traditional institutions to provide specific job-oriented short-term training for high school and university graduates who are either unemployed or working in jobs that do not use their education. Right from the start, such a program should be organized with business. This type of training initially cannot take place in traditional universities and other mainstream education institutions given their academic cultures and set curricula that make them less able to engage with businesses and adapt flexibly to meet their needs. This need not necessarily mean establishing new institutes. Existing institutes could be taken outside the regular academic system, given a mission-oriented mandate and governance structure, and run jointly by the government and business.

Four possible areas: construction, export-oriented manufacturing, mining, and agribusiness.

Skills for construction. When its transformation strategy called for it, Korea created specialized training institutes to quickly develop a cadre of skilled construction workers. The country built the Seoul-Busan expressway (the World Bank doubted the feasibility) with

Box 4.1 Reverse the brain drain with a brain gain

The Korean government set up the Korean Institute of Science and Technology (KIST) in 1966 to spearhead and coordinate the technical drive for industrialization. KIST contacted 800 Korean scientists living abroad, selected 69 candidates specializing in the research areas it needed, and after personal interviews hired 18. It recruited 68 more in 1975. Incentives included salaries as much as three times those of national university professors.

Although the huge incentives and differential between KIST scientists and those in national universities no longer prevail, the initial efforts to attract world-class researchers have paid off. KIST now is the hub of a network for scientific research with 5,000 scientists, 40% in Korean universities, 40% in industry, and 20% in other research institutes.

KIST’s leadership underpinned Korea’s industrial drive in steel, automobiles, ships, petrochemicals, semiconductors, and telecommunications. With a branch in Saarburcken, Germany, KIST is now world renowned, owning high-tech patents and attracting top researchers and students from around the world, including Sub-Saharan Africa.

On a similar path Taiwan (China) created the Industrial Technology Research Institute (ITRI) in 1970 and the Hsinchu science-based industrial park in 1980. To attract Taiwanese scientists and engineers from abroad, it offered high-quality residential and recreational facilities and a bilingual high school for their children.

By the mid 1980s Taiwan Semiconductor, founded by ITRI, had 800 engineers, 100 with degrees from U.S. universities and another 10 with work experience of more than a decade in the United States.

Governments need to enter serious discussions with donors and development banks about local hiring preferences in construction tenders.

**Box 4.2 Developing information and communication technology skills**

Rwanda is trying to become a leading information and communication technology hub and knowledge economy in East Africa. To do this it has to train a mass of information and communication technology professionals, so the country has partnered with Carnegie Mellon University, one of the world’s leading engineering universities.

Carnegie Mellon Rwanda opened for classes in fall 2012 with six faculty and 40 students pursuing a master of science degree in information technology. It expects 150 students by 2017.

Open to students worldwide, the program caters mainly to East Africans, with government scholarship covering 50% of costs for Rwandan students, who can also get loans for their other costs.

The university also offers four-day courses for executives and mid-level professionals to strengthen leadership and innovation skills. It plans a master of science degree in electrical and computer engineering for fall 2014.

Source: [www.cmu.edu/rwanda](http://www.cmu.edu/rwanda).

**Box 4.3 Creating regional centers of excellence in science**

The African University of Science and Technology (AUST) was set up in Abuja in 2007 to become a regional center of excellence, as was the the African Institute of Science and Technology in Arusha in 2009, with the support of governments and the World Bank. Both offer masters and doctoral programs, accepting students from all African countries. AUST issued 64 master’s degrees and one doctoral degree in 2013. In 2011 a student from AUST won the Bernard Ziegler Award for work on discrete event systems, modeling language and graphical simulation, with a professor from Blaise Pascal University in Clermont-Ferrand, France.

The International Institute for Water and Environmental Engineering was set up in Ouagadougou in 2006 to train professionals for 14 West and Central African countries. It has since trained 5,000 and now has 2,000 students on campus (from 27 countries) and 1,500 distance learners (from 43 countries worldwide). Some 90% of the institute’s graduates find work within six months of graduating.

In 2012 two students won an entrepreneurship award at the Global Social Venture Competition (University of California, Berkeley) for coming up with a highly nutritious powder to fight malnutrition, called FasoProt. And in 2013 two others won the grand prize at the same competition, the first by non-Americans, for inventing a soap to fight malaria, FasoSoap.

Source: [www.nm-aist.ac.tz](http://www.nm-aist.ac.tz), [www.aust-abuja.org](http://www.aust-abuja.org), and [www.2ie.edu.org](http://www.2ie.edu.org).

**local expertise and finished the 429 kilometer project in 29 months— ahead of schedule. In the 1970s, when the economy went into recession, following the first oil shock, it deployed its skilled construction workers to the Middle East, earning valuable foreign exchange.**

Now consider roads in Africa. Many governments have looked to foreign donors and financing entities to support road construction, thinking only of the product—a road—and not of who is building it and how. But foreign contractors typically bring their own technical staff and skilled workers. Through the rest of this decade billions of dollars will be poured into Africa’s transport network under the Programme for Infrastructure Development in Africa, requiring many thousands of workers. Billions more will go into national highways and feeder roads.

Rather than just thinking of getting foreigners to finance and build roads (and major buildings) for them, governments should think about developing construction capabilities and skilled construction workers, which foreign finance would help put to work. For that to happen, governments need to enter serious discussions with donors and development banks about local hiring preferences in construction tenders.
Skills for export-oriented manufacturing. Ireland, Malaysia, and Singapore ignited exports by developing skills outside the education system to attract foreign investors. True, they provided fiscal and trade incentives and the conveniences of special economic zones and industrial parks, but the availability of skilled labor was a key part of their value proposition (box 4.4).

In 1969 Ireland began setting up regional technical colleges, later renamed Institutes of Technology, outside the traditional system of higher education. Eventually there were 13 in major cities and towns providing mid-level technical education in science, engineering, business, and art and design to staff the export-oriented growth poles. Staffing the institutes were young and creative people with foreign experience. Importantly, they were not steeped in the culture prevailing in existing institutions of higher learning—and they had considerable freedom to innovate.23

Inspired by this example, the national institutes of higher learning in Dublin and Limerick also organized along these lines and worked with business to introduce incubators on campus. Later, other established universities followed suit and began to undertake applied research. To market Ireland’s skills base as a competitive advantage, the presidents of these institutions, along with faculty, joined tours organized by the Ireland Development Authority (the investment promotion agency) to attract foreign direct investors.

Singapore’s Economic Development Board established training centers in collaboration with foreign companies and foreign governments. Several training centers were established to develop skills required by the companies that the board had attracted or was trying to attract to Singapore. Although the Ministry of Education was involved, these training centers were outside the regular education system and under the board, which was coordinating Singapore’s economic transformation drive and its efforts to attract foreign direct investment.24 A hallmark of these training centers was the involvement of the private sector and their flexibility to respond to market needs. Later, they were amalgamated to form Singapore’s polytechnic system, which has retained these attributes.

African countries can emulate these models. Indeed, Kenya, Nigeria, and South Africa are going outside their traditional education systems in partnerships with Samsung (box 4.5). Another good recent example in Africa is training in shoemaking (box 4.6).

Skills for mining. Many African countries are exporting oil, gas, and minerals, but the resources have been developed mainly as enclave projects with few links with the economy and few jobs for nationals. With resource-based industrialization as one of the more promising transformation options, governments need to promote links between extraction and the economy. How?

---

Box 4.4  Malaysia’s three-part harmony: official, private, academic

To ignite Malaysia’s economic transformation, the government, firms, and academia set up the Penang Skills Development Center to provide job-oriented training outside the regular education system. The state’s chief minister brought in the chief executive officers of Hewlett-Packard, Intel, and Motorola to form a steering committee that asked their training and human resource managers to develop a concept paper for the center, which opened in 1989, with 24 companies as founding members.

Based in Penang, home to many foreign-owned operations, the center now has more than 170 business partners—constituting a global who’s who of major multinationals—that supply ideas, content, equipment, trainees, and leadership. About 75 companies offer attachment programs in precision machining technology, diplomas in engineering, and industrial skills training for recent graduates.

The first industry-led skills center in Malaysia, it set the mold for the country’s other states, many of which now have similar programs. Its certificate and diploma courses train shop-floor workers as engineers and technicians. It also prepares trainees for entry to undergraduate and graduate programs at four Malaysian and eight foreign universities.

The center produces an industrial talent requirement study that assesses the capacity and proficiency of Penang’s workforce and estimates future manpower requirements of the state’s manufacturing companies, identifying gaps in proficiency and mismatches in skills.

Source: www.psdc.org.my.
With resource-based industrialization as one of the more promising transformation options, governments need to promote links between extraction and the economy.

By targeting skills development. Governments should partner with extractive firms to support efforts to produce skills relevant for extractive and related activities. The government of Botswana did just this in partnering with Debswana, the diamond miner (box 4.7).

Companies could also help strengthen engineering and other science departments in existing universities and in technical and vocational institutes. The Jubilee Technical Training Centre, recently set up at the Takoradi Polytechnic in Ghana by the Jubilee Partners, an oil drilling and production company, will offer courses in instrumentation, occupational health and safety, and mechanical, electrical, and process engineering.25

**Skills for agribusiness.** Few African countries have institutes dedicated
Countries should provide literacy training for adults and opportunities for those in informal work to enhance their skills and earnings.

Countries should provide literacy training for adults and opportunities for those in informal work to enhance their skills and earnings. Debswana Diamond Company, the world’s leading producer of gem diamonds, is owned in equal shares by the government of Botswana and the South African company De Beers. Early on it built and ran primary schools at its Orapa and Jwaneng mines, targeting employee children but also benefiting those from the communities. Later it set up junior secondary schools in the two towns, working with the government. And through its Government Schools Development Program, launched in 2002, it promotes the quality of teaching in English, science, and mathematics.

To training young graduates so that they can go into agroprocessing or agribusiness—or into work solving the technical problems of these sectors. Exceptions include floriculture and horticulture in Ethiopia and wine in South Africa.

Governments should consider an institute to develop skills, amass knowledge, and solve problems for a small number of agricultural products in their comparative advantage. The institute should partner with private producers, working with them to solve their problems and prepare graduates for careers in the sector.

Models for doing this abound. U.S. land grant and state universities, such as Cornell, Texas A&M, and the University of California at Davis (UC Davis), deliver skills and solutions to support agriculture and related industries. Finland and Sweden have universities and technical institutes for forest products. Chile trains forestry engineers and had an agreement with UC Davis to train agronomists and agricultural economists. Malaysia has the Palm Oil Research Institute, the Agricultural Research and Development Institute, and university courses for product diversification and new product development. The success of Ghana’s cocoa industry owes a lot to the Cocoa Research Institute, which researches cocoa diseases and develops hybrids of seedings to improve both yield and quality of Ghana’s cocoa—the standard for bean quality on the world market.

What about informal work?

Engineering an economic transformation is impossible if many workers cannot read or are locked in low-return activities. By 2015 Sub-Saharan Africa will have 176 million people ages 15 and older who are illiterate, 44 million of them ages 15–24 and set to be in the labor force for decades. Added to this are many literate people working in activities with low earnings.

Because it will take time for the formal economy to absorb the bulk of the labor force, countries should provide literacy training for adults and opportunities for those in informal work to enhance their skills and earnings—in three ways.

- Adult literacy programs can be run at low cost in school classrooms and other community facilities after hours and during weekends. Again, unemployed secondary and university graduates could be recruited and trained as teachers, and those already working could volunteer. Grants to civil society organizations could attract them as well. Coming out of war in 1975, Vietnam set the goal of universal literacy in the South, and thanks to communities working with government, 1.3 million of the
1.4 million targeted were literate by 1978.28

- Second-chance programs, some run by private providers and subsidized by the state, can encourage young school dropouts to go back to school or get instruction that enables them to obtain primary and secondary diploma equivalents. Simplified curricula, especially for English, allow students to progress quickly and get back into the formal system.
- Apprenticeships dominate in providing trade skills in Sub-Saharan Africa, with easy entry and often in mother tongues.29 But most are detached from the formal economy and technological advances. To remedy this, technical and vocational institutes could update the skills of educated master craftsmen for free or at subsidized rates. They could also provide incentives to their own graduates who are operating as independent technicians running repair and installation shops to take on and train apprentices. And they could enroll apprentices in complementary (such as weekend) training and expose them to modern industrial equipment. Burkina Faso, Ghana, and Senegal are moving in these directions.30

In addition, competency-based tests that enable apprentices and craftsmen in the informal economy to formally certify their skills would set standards and lift the quality of craftsmanship, as they have done in Mauritius and Kenya (box 4.8).31 It is also important for public safety.

### Upskilling workers through lifelong learning

Also important is upgrading the skills of people already on the job, not once but all through their working lives. A national qualifications framework can support competency-based skills training, and technical and vocational institutes, especially those outside the regular education system, can offer such training outside work hours. Companies and unions can pay into a skills development fund, open to employers or directly to workers, to finance the cost of training.

The organization of training, the split of training between in-house and outside, and the nature of funding and terms of access will naturally differ by country. But such programs for upskilling and lifelong learning have driven the transformations in Finland, Ireland, Singapore, South Korea, and many other countries.32

Coordinate skill building, don’t fragment it

A country needs to establish a system for building technical skills

---

**Box 4.8 Training entrepreneurs for Kenya’s informal sector**

The Kenyan government and the country’s leading private sector alliance, KEPSA, have forged a promising new partnership to train unemployed youth to start their own businesses—or to work for entrepreneurs already in business. It is known as the Kenya Youth Empowerment Project, and the results so far, based on a three-year pilot project with nearly 9,000 of the country’s estimated 5 million unemployed youth, suggest a promising model.

The $18 million training program seems simple on the surface. Program participants—who must be between the ages of 15 and 29, have the equivalent of a high school degree or above, and be unemployed for the previous 12 months to qualify—are put through an intensive six-month immersion that not only teaches them core business skills but also enhances their self-esteem. Next they receive several weeks of intensive training in sector-specific business and career development skills, as well as financial management training for entrepreneurship. Then they are assigned a business mentor, who helps them get their fledgling enterprise up and running and guides and supports them as they grow.

More than 6,000 interns—about 70% of total program participants—are now working in the country’s informal sector, and some 2,250 graduated in 2013 alone. Ehud Gachugu, who directs KEPSA, is drawing up plans to expand the current program beyond the three training centers operating in Nairobi, Mombasa, and Kisumu. “The informal sector is a growing part of the economies throughout Africa, and this is not going to change any time soon,” Gachugu notes. “Urgent attention must be given to create a conducive business environment for sustained growth here in Kenya and elsewhere—and getting youth working again is the key.” Thousands more Kenyan youth could be accommodated with additional funding.

Source: Personal communication with Ehud Gachugu; Njoroge 2010.
A country needs to establish a system for building technical skills that is aligned with its ambitious transformation objectives and that motivates individuals to respond. And that system has to go beyond the ministries with portfolios for education and training. It has to involve the many economic ministries and agencies in government. It also has to involve firms large and small, formal and informal. This requires good coordination—within government and between government and business.

The coordinating economic bodies in Singapore (Economic Development Board), South Korea (Economic Planning Board), and Taiwan (China; Council for Economic Planning and Development) had overriding power over other institutions responsible for skills development. That allowed them to monitor the supply and demand for skills in the industries they were trying to develop and to adjust to market developments. In the 1990s Finland responded to the loss of the Soviet market, a financial crisis, and impending accession to the European Union by formulating a new national competitiveness strategy that would help it diversify away from forest products and other traditional industries and move toward private innovation in knowledge and information industries, particularly telecommunications. The government also ramped up its support for research and development and built new partnerships with industry and academia, with profound impacts on secondary and even primary education. In short, these countries put skill building at the core of their transformation agendas. Sub-Saharan countries need to do the same if they are to ignite and sustain their economic transformations. Ethiopia and Rwanda are doing just that, putting their efforts and their resources into raising education performance (Box 4.9). They have also identified the strategic economic areas where they have potential comparative advantages, and they are rapidly building the skills critical to turning that potential into real competitive market advantages.

<table>
<thead>
<tr>
<th>Box 4.9 Putting skills at the core of Ethiopia’s growth and transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>To implement Ethiopia’s five-year Growth and Transformation Plan for 2011–15 (see chapter 1), Mekonnen Manyazewal, former minister of industry and now commissioner of the new national planning commission, says, “We must provide a learning base for entrepreneurs to grow. Ethiopia’s education sector must be restructured toward science and technology, with a target of 70% of students enrolling in science and technology programs, 40% of them in engineering.” The plan’s strategic directions for education and training focus on preparing a workforce that industry demands. Some of the highlights resonate with many of the ideas in this chapter.</td>
</tr>
<tr>
<td>For general education:</td>
</tr>
<tr>
<td>• Expand early childhood education.</td>
</tr>
<tr>
<td>• Supervise quality, support materials development, and provide curriculum standards.</td>
</tr>
<tr>
<td>• Improve the quality and efficiency of education at all levels.</td>
</tr>
<tr>
<td>• Expand functional adult literacy to all regions.</td>
</tr>
<tr>
<td>For TVET:</td>
</tr>
<tr>
<td>• Develop occupational standards, accredit competencies, assess, and accredit occupations.</td>
</tr>
<tr>
<td>• Assess whether trainees fit the profile and demands of their chosen career.</td>
</tr>
<tr>
<td>For higher education:</td>
</tr>
<tr>
<td>• Ensure that training is in line with the demands of the economy.</td>
</tr>
<tr>
<td>• Facilitate transfers of technology and knowledge.</td>
</tr>
<tr>
<td>Source: Ethiopia Ministry of Finance and Education 2010.</td>
</tr>
</tbody>
</table>

Notes
1. In 2010 the region had 10.3% of the world’s working-age population (those ages 15–64). By 2050 its share is estimated to double to 20.8%. From 465.8 million in 2010, the region’s working-age population is estimated to rise to 1.22 billion by 2050, surpassing India (1.14 billion) and China (0.79 billion). The share of youth (ages 15–24) in the working population in 2050 is estimated to be 18.5% in Sub-Saharan Africa compared with the world average of 13.5% (UNDESA 2011).
2. Current SACMEQ member countries are Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zanzibar, and Zimbabwe.


4. Minimum learning in mathematics is defined as level 1 for PASEC and level 3 for SACMEQ.

5. TIMSS also tests at the grade 4 level, but no Sub-Saharan country participates. For Botswana and South Africa the grade 8 tests are taken by their grade 9 students. For Ghana the grade 8 tests are taken by their grade 9 students.


16. Law forthcoming.


18. Singapore continues with the policy. South Korea widened the “gate” starting in the mid-1990s leading to higher enrollments at the tertiary level for both technical and academic disciplines, but also increasing the unemployment rate of tertiary education graduates (Ashton 2012).


20. World Bank 2009 (p. 75 and also table 3.2).


22. Lim 2011.


24. The Economic Development Board was set up under the Ministry of Finance and later placed under the Ministry of Trade and Industry.

25. Daily Graphic 2013. The Jubilee Partners comprise the following oil companies operating in Ghana: Tullow Oil, Ghana; Kosmos Energy, Ghana; Anadarko WCTP, Ghana; Ghana National Petroleum Corporation (GNPC); and Sabre Oil and Holdings.


27. Fredriksen and Kagia 2013.


33. OECD 2011.

References


TIMSS 2011 International Database. TIMSS and PIRLS International Study Center, Chestnut Hill, MA. http://timss.bc.edu/timss2011/international-database.html.


World Development Indicators (database). World Bank, Washington, DC.