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IMPROVING HIGHER EDUCATION PERFORMANCE IN KENYA: A POLICY REPORT

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Kenya Higher Education Policy Note

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Acronyms

AAU	Association of African Universities
ACBS	Academic Credit Bank System
ACE	Adult Continuing Education
ADB	African Development Bank
AHELO	Assessment of Higher Education Learning Outcomes
AI	Artificial Intelligence
ALEKS	Assessment and Learning in Knowledge Spaces
AOU	Arab Open University
AP	Advanced Placement
ASU	Arizona State University
AU	Anadolu University
BPO	Business Processing Outsourcing
CAAP	Collegiate Assessment of Academic Proficiency
CCCOER	Community College Consortium for Open Educational Resources
CHEA	Council of Higher Education Accreditation
CLA	Collegiate Learning Assessment
CLRC	Community Learning Resource Center
CoL	Commonwealth of Learning
COPAES	Council for Accreditation in Higher Education (<i>Consejo para la Acreditación de la Educación Superior</i>)
CUE	Commission for University Education
CUNY	City University of New York
DAAD	German Academic Exchange Service
DUC	Differential Unit Costing
EQUIP	Educational Quality through Innovative Partnerships
EPP	ETS Proficiency Profile
ERA	Excellence in Research for Australia
EU	European Union
FOMEC	Argentina's Quality Improvement Fund
GDP	Gross Domestic Product
GSU	Georgia State University
HCC	Houston Community College
HCI	Human Capital Index
HECS	Higher Education Contribution Scheme
HELB	Kenyan Higher Education Loans Board
ICT	Information and Communication Technology
IGNOU	Indira Gandhi National Open University
IoT	Internet of Things
ISFAP	Ikusasa Student Financial Aid Programme
IT	Information Technology
KAPI	Key Academic Performance Indicator
KAIST	Korea Advanced Institute of Science and Technology
KCSE	Kenya Certificate of Secondary Examination
KCTCS	Kentucky Community and Technical College System
KENET	Kenya Education Network Trust
KIHBS	Kenya Integrated Household Budget Survey

KLIUC	Kuala Lumpur Infrastructure University College
KNQA	Kenya National Qualifications Agency
KRA	Kenya Revenue Authority
KUCCPS	Kenya Universities and Colleges Central Placement Service
LIA	Letter of Interim Authority
LMO	Labor Market Observatory
LMS	Learning Management System
MIT	Massachusetts Institute of Technology
MMU	Multimedia University
MOOC	Massive Open Online Course
MOU	Memorandum of Understanding
NACOSTI	National Commission for Science, Technology, and Innovation
NAU	Northern Arizona University
NDTS	Nairobi Design Thinking School
NESSP	National Education Sector Strategic Plan
NGO	Nongovernmental Organization
NHIF	National Hospital Insurance Fund
NOUN	National Open University of Nigeria
NOVA	Northern Virginia Community College
NSSF	National Social Security Fund
ODE	Online and Distance Learning
ODT	Open Document Text
OECD	Organisation for Economic Co-operation and Development
OER	Open Educational Resources
OPM	Online Program Manager
OU	Open University (in the United Kingdom)
OUA	Open Universities Australia
OUK	Open University of Kenya
OUSK	Open University Hong Kong SAR, China
OUSL	Open University of Sri Lanka
OUM	Open University Malaysia
PISA	Programme for International Student Assessment
QA	Quality Assurance
REF	Research Excellence Framework
RPL	Recognition of Prior Learning
SAT	Scholastic Aptitude Test
SENAI	National Industrial Training Services
SNHU	Southern New Hampshire University
SNU	Seoul National University
SRF	Student Risk Factor
STEM	Science, Technology, Engineering, and Mathematics
TFT	Targeted Free Tuition
TIMMS	Trends in International Mathematics and Science Study
TVET	Technical and Vocational Education and Training
TVETA	Technical and Vocational Education and Training Authority
UCF	University of Central Florida
UCLA	University of California, Los Angeles
UGA	University of Georgia
UNESCO	United Nations Educational, Scientific, and Cultural Organization

UNC	University of North Carolina
UNISA	University of South Africa
UTP	Universiti Teknologi Petronas
VLE	Virtual Learning Environment
WACE	World Association for Cooperative Education
WFC	Weighted Fractional Count
WGU	Western Governors University
WSU	Wichita State University

Executive Summary

The Changing Context: New Challenges, New Opportunities

The 2018 World Development Report on the transformation of labor markets outlines important changes brought about by the digitalization of the economy in the context of the 4.0 Economic Revolution (World Bank 2018). First, the boundaries of the traditional firm are becoming blurred, as illustrated by the rapid growth of platform marketplaces that connect customers, producers, and providers in new ways. Second, technology is reshaping the demand for skills. Technological change is driven, to a large extent, by the development of digital firms, which require well-qualified information and communication technology (ICT) specialists and technicians trained locally. This evolution, in turn, provokes the transformation of many jobs in traditional firms. Growth in economic activity and jobs is stronger in countries that are experiencing accelerated technological advances.

The World Development Report found that, while the demand for low skills profiles is declining, “the demand for advanced cognitive skills, socio-behavioral skills, and skill combinations associated with greater adaptability is rising” (World Bank 2018, 6). Emerging economies such as Kenya can seize this opportunity by giving a higher priority to human capital development. In that respect, Kenya’s results in the Human Capital Index (HCI), a new measure of countries’ human capital capacity launched in 2018 by the World Bank, are relatively satisfactory. At 0.52 in 2017, Kenya’s HCI is higher than the average for its region (0.40) and income group (0.48), with females doing slightly better than males. Ranked 94 out of the 157 countries for which data are available, Kenya has the third-best score among all Sub-Saharan African countries, after the Seychelles (43) and Mauritius (52), and well ahead of South Africa (124). But there is room for improvement. The country’s HCI of 0.52 means that the expected productivity, as a future worker, of a child born today in Kenya is only 52 percent of what it could be with complete basic education and full health.

A recent assessment of the rising demand for skills in Africa, prepared by the World Economic Forum (2017), indicates that many employers in Sub-Saharan Africa view an inadequately skilled labor force as a major constraint. This is often because a growing proportion of jobs in the region are becoming ICT intensive. The World Economic Forum predicts that 52 percent of all work activities in Kenya are likely to be automated in the next few years, compared to 44 percent in South Africa and 46 percent in Nigeria. Statistics reveal that jobs with high ICT intensity represent 18.4 percent of all formal sector employment in Kenya, compared to 6.7 percent in Ghana.

On the positive side, Kenya is ranked one of the fastest growing digital economies with high momentum and potential for growth. About 25 percent of digital innovation start-ups in Africa are based in Kenya. The country is widely regarded as the leading ICT innovation hub in Sub-Saharan Africa, as illustrated by the success of the mobile payment service pioneered by the Kenyan telecom operator Safaricom. Since 2010, gross domestic product (GDP) growth has averaged 5.6 percent, which is 1.8 percentage points higher than the average for Sub-Saharan African countries during this period (3.8 percent) and 2.0 percentage points higher than the growth rate of the Kenyan economy in the previous decade (3.6 percent growth). Though all sectors have contributed to the increase in growth, the rapid increase in the services sector (especially the ICT and financial subsectors) has accounted for more than half of the increase in GDP growth.

Against this background, Kenya’s development efforts for the next few years, articulated in the ‘Big Four Agenda’, aim to enhance the country’s competitiveness in line with Vision 2030. For this, the government formulated in 2018 a new five-year education plan (2018–2022), which includes priority areas for investments in higher education. Higher education initiatives in the education plan focus on translating what students learn into labor market demands, with thematic areas around increasing access and equity, improving quality and relevance, and addressing governance and accountability. Priorities outlined in the national education strategy include establishing the Open University of Kenya (OUK); improving retention, well-being, and productivity of university students; and increasing access to science, technology, engineering, and mathematics (STEM) programs. Specifically, the plan proposes the following key objectives:

- Increase the gross enrollment ratio in university education from 7 percent to 15 percent.
- Enhance the quality and relevance of training and research.
- Increase access to STEM programs to 60 percent of the student population.
- Create opportunities for academic staff to acquire PhDs and appropriate pedagogical skills.
- Establish the OUK (30 percent of degree programs available through an e-learning mode by 2022).
- Enhance equity and inclusion in university education, especially for females and students from low-income families.
- Strengthen governance and management of university education.

In this context, the policy report seeks to explore a range of options for designing and implementing a sustainable higher education financing strategy in Kenya, improving the quality and relevance of existing higher education institutions and programs, and leveraging technology to achieve the twin goals of quantitative expansion and quality improvement. This involves careful consideration of the following key questions:

- **Expansion scenarios.** Are available resources sufficient to support the likely expansion of the higher education system in the next two decades? What are the policy implications of the various scenarios considered?
- **Shape and size of the system.** What institutional configuration would allow for a balanced and financially sustainable expansion of the higher education system? What is required to make this configuration a viable option?
- **Resource mobilization.** How can public and private funding sources be mobilized in the most effective manner? How can financial barriers be effectively removed for students coming from poor and vulnerable groups?
- **Resource allocation.** What are appropriate mechanisms to distribute public resources in a manner that rewards improved performance, promotes innovation, and encourages efficient use of available resources?

- **Quality and relevance.** How successful are the Kenyan higher education institutions in training highly-qualified graduates who perform well in the labor market? Is the national quality assurance (QA) system adequately fulfilling its regulatory and quality enhancement missions? What could the Kenyan higher education institutions do to improve their curriculum and pedagogical practices? What is needed to increase the effectiveness of the QA system? How can the country build a reliable and useful labor market observatory (LMO)?
- **Harnessing technology.** How can Kenyan universities learn from successful developments in the use of modern technology to leverage online platforms and resources as effective ways of increasing access and improving quality/relevance?

The selection of the areas of focus of this Policy Report was informed by the policy priorities expressed by the Kenyan government. It also considered the themes already covered in the 2016 World Bank report. That report, entitled ‘Expanding Tertiary Education for Well-Paid Jobs - Competitiveness and Shared Prosperity in Kenya’, extensively analyzed the governance structures and processes in place in the higher education system and reviewed good practices in the area of student loans.

Diagnosis of the Present Situation

The Kenyan higher education system is full of contrasts. On the one hand, five Kenyan universities are among the top 100 African institutions. The University of Nairobi, in particular, has established itself as one of the top performers in Sub-Saharan Africa, right after the leading South Africa universities. Several Kenyan universities are recognized as hotbeds of innovation, as illustrated by recent technological breakthroughs—the Maker Movement at the Science and Technology Park of the University of Nairobi, which designed effective, low-cost, locally sourced medical equipment that can improve maternal, infant, and child health; the Waste for Wealth project at Moi University, which uses organic waste to make tables that help create new sources of income and curb plastic and glass waste; and the Save Food Save Life project at Odinga University of Science and Technology, which aims at reducing post-harvest losses through preservation of fruits and vegetables with clay coolers.

On the other hand, the Kenyan public universities are in a dire financial situation. Quantitative expansion seems to have occurred at the expense of quality. The number of universities and colleges climbed from 31 in 2009 to 68 in 2014, and the net enrollment rate increased to 7.5 percent in 2014 from 4 percent in 2009. Even though the share of public expenditures going to higher education has grown in recent years, from 15.5 percent in 2013/14 to 22.7 percent in 2018/19, representing a special effort from the Government of Kenya, it has barely kept pace with the increase in the number of public universities. Sometimes, the creation of new public universities has responded more to political considerations than actual demand for the programs that they offer.

There is, therefore, a sense that it will be difficult, if not impossible, to continue increasing the volume of public resources allocated to higher education. While the university leaders have called for fee raises to keep up with the financing needs of their institutions, the students have strongly rejected any increase. Table 1 shows the shortfall experienced by both public and private universities.

Table 1. Income and Expenditure (KES, millions) - Academic Year 2013/14

	Income					Expenditure	Deficit
	Government	Student	Research	Other	Total		
	Capitation	Fees	Grants	Incomes			
Public	133,398.26	117,922.89	14,495.33	13,801.49	279,617.98	281,487.54	1,869.56
Private	0	53,804.88	1,480.64	11,009.70	66,295.22	73,418.00	7,122.78
Total	133,398.26	171,727.78	15,975.97	24,811.19	345,913.20	354,905.54	8,992.34

Source: State of University Education in Kenya 2016.

This has led the vice-chancellors of public universities to express their concern over a looming ‘cash crisis’ that could have a negative impact on the quality of their programs. Indeed, the fast enrollment growth has created a tension between the social demand for further expansion and the need to improve quality and relevance through appropriate programs and effective learning models. The fact that the government had to close down many private institutions in recent years confirms the prevalence of poor quality in many parts of the system.

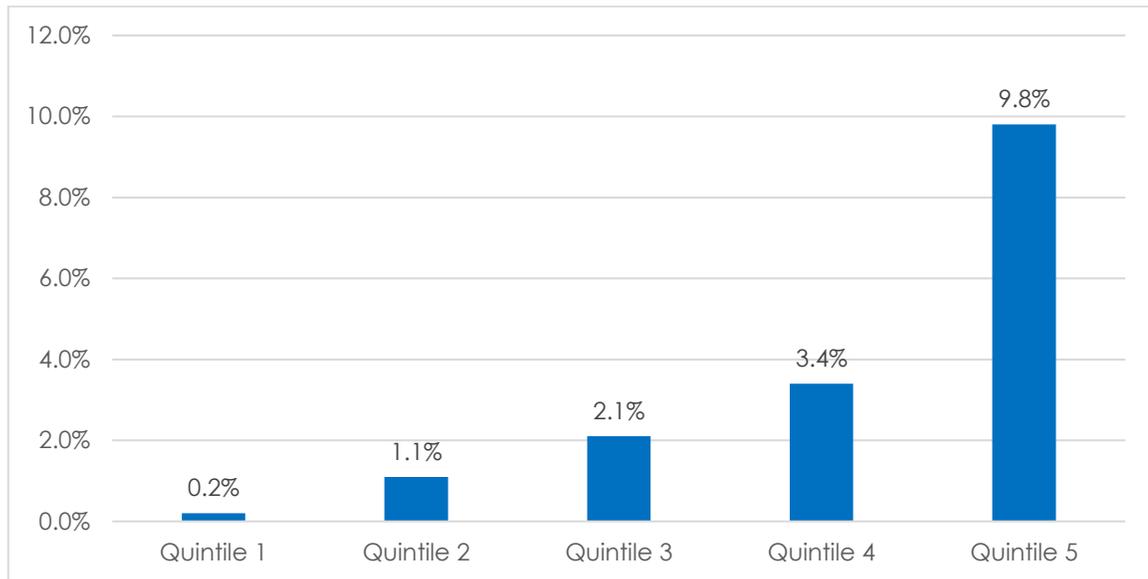
In this context, the performance of the Kenyan higher education system can be measured by looking at three aspects: (a) coverage and equity, (b) quality and relevance of university graduates, and (c) research and technology transfer output.

Coverage and Equity

At 11.7 percent, Kenya’s higher education enrollment rate is slightly higher than the regional average of 9.3 percent but much lower than the upper-middle-income economies that Kenya aspires to emulate. Vision 2030 outlines that Kenya aims at achieving standards like Southeast Asian ‘newly industrializing countries’ such as Hong Kong SAR, China; Singapore; Republic of Korea; and Taiwan, which all have an enrollment rate higher than 70 percent.

Furthermore, there are huge disparities in access by economic status. Figure 1, which presents the socioeconomic distribution of students, confirms the extremely unequal social configuration of the Kenyan higher education system in spite of the availability of financial aid. Participation for the richest households is three times higher than the second-richest income group. At the time of the last household expenditures survey, 9.8 percent of the households in the highest quintile had a member enrolled in university education, compared to 0.2 percent for households in the lowest consumption quintile. The disparity ratio is 49, meaning that a young Kenyan from the richest income group is 49 times more likely to access higher education than one from the lowest income group. This is because poor students tend to progress less well through primary and secondary education than those coming from the richest income groups with the highest cultural capital, and they are less well prepared academically when they take the KCSE.

Figure 1. Enrollment Rates of Kenyan Students by Income Quintile (2016)



Source: Kenya Integrated Household Budget Survey (KIHBS) 2015/16.

Spatial disparities are also acute. Most universities are located in urban areas with about half of the counties in Kenya having no university.

Quality and Relevance

While there has been no systematic evaluation of quality standards in Kenyan universities in recent years, it appears that rapid enrollment growth in the universities has come at the expense of quality. The number of academics teaching at public universities has grown by only 13 percent between 2011 and 2018, while student numbers rose fivefold. Even though the government has accelerated the production of postgraduate degree holders who are candidates for recruitment as university faculty members, many Kenyan universities do not have sufficient numbers of qualified staff, which undermines the quality of the training offered. The direct result of this growing gap between student enrollment and availability of qualified faculty is that student-teacher ratios have soared over the years, reaching close to 70:1 in several public universities. In addition, pedagogical practices continue to be very traditional in many higher education institutions, with overreliance on rote learning and outdated curricula that tend to be excessively theoretical. Finally, industrial actions often interrupt university life, reducing the time for student learning.

The technical and vocational education and training (TVET) institutions also face many challenges. Most of them do not have adequate infrastructure and equipment to support the teaching of the national competency-based curriculum. Many instructors have not received appropriate training to teach technical skills. The program of these institutions is not fully aligned with the competency-based curriculum, and the links with industry are quite weak. In addition, these institutions are dispersed across several ministries, resulting in limited homogeneity in programs and standards. For these reasons, parents and students perceive TVET programs as second-rate options for students with lower academic abilities and aspirations.

The 2013 World Bank Enterprise Survey showed that 30 percent of Kenyan firms reported an inadequately educated workforce as a major obstacle to their operations and growth, compared to only 3 percent when the 2007 Enterprise Survey was administered. Similarly, the 2017/18 global competitiveness index identified insufficient capacity to innovate, poor work ethics, and an inadequately educated workforce as some of the most challenging factors for doing business in Kenya.

Research and Technology Transfer

As revealed by Table 2, the research output data clearly show that Kenya is the second research powerhouse in Sub-Saharan Africa, after South Africa. If South Africa is not included in the picture, Kenya not only leads the pack in terms of quantitative production (number of citable documents), but more importantly it is also plainly ahead when it comes to the quality and impact of the research produced, as evidenced by its higher H-index.

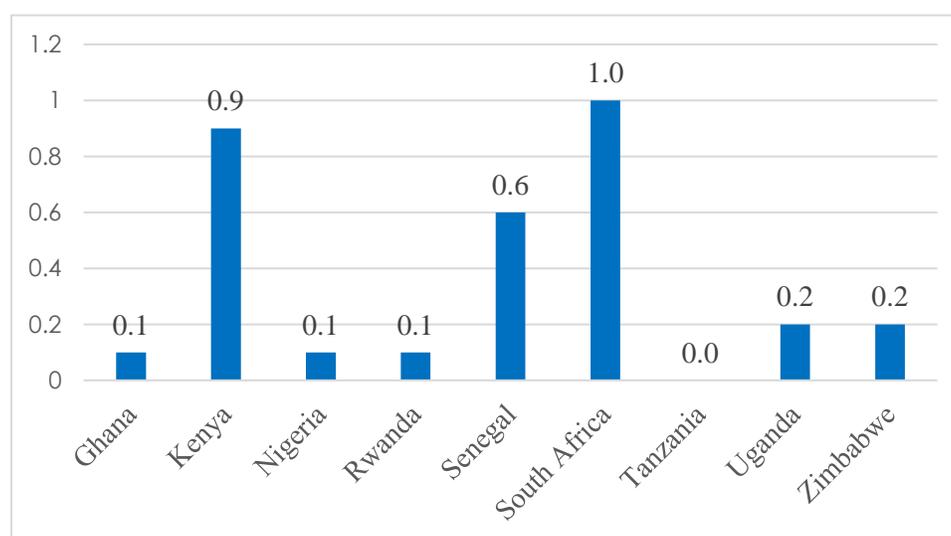
Table 2. Research Output of Kenya and Comparator Countries (2010 and 2018)

Country	Citable Documents per 1 Million Inhabitants (2010)	Citable Documents per 1 Million Inhabitants (2018)	H-Index (2018)
Ethiopia	9.2	181.6	125
Ghana	30.4	516.4	129
Kenya	36.3	565.1	216
Nigeria	31.6	366.2	166
Rwanda	12.8	173.9	70
Senegal	29.8	546.9	111
South Africa	229.2	4,233.5	391
Tanzania	17.8	248.3	145
Uganda	25.6	323.3	156
Zimbabwe	24.6	561.2	119

Source: SCImago. SJR: SCImago Journal & Country Rank. <https://www.scimagojr.com>.

Finally, measures of technology transfer indirectly capture the contribution of Kenya's universities to the national innovation system and to the development of the regions that they serve. Data on the number of patents granted relative to GDP in Kenya and comparator countries on the continent show promising results for Kenya, whose output is almost as high as South Africa (Figure 2).

Figure 2. Patents for Kenya and Comparator Countries (Relative to PPP US\$ GDP, 2018)



Source: Global Innovation Index. <https://www.globalinnovationindex.org/gii-2018-report>.

Note: PPP = purchasing power parity.

Options for Reform and Development

Today, the Kenyan government’s main challenge in higher education is to find a financially sustainable way of expanding access in an equitable manner, improving the quality and relevance of the programs offered, and strengthening university-based research and technology transfer.

Sustainable Financing Strategy

Three scenarios have been considered to simulate the likely evolution of the higher education system under various assumptions:

- **Scenario 1:** This is the “status quo” scenario, working with the parameters of the current situation and maintaining higher education coverage in a proportion comparable to what exists now (1,200 students per 100,000 inhabitants).
- **Scenario 2:** This is the “quantitative expansion” scenario, reflecting a sharp increase in higher education enrollment aligned with the country’s development ambitions in Kenya’s Vision 2030. This would see a doubling of enrollment by 2030 to reach the ratio of 1,500 students per 100,000 inhabitants, without significant changes in the parameters affecting the quality and relevance of education.
- **Scenario 3:** This third scenario puts more emphasis on quality improvement than quantitative expansion. It foresees a moderate increase in coverage with quality improvements. This scenario retains a slower quantitative evolution compared to that of Scenario 2, with a target of 1,300 students per 100,000 inhabitants, but with a larger share of private sector enrollment to mitigate the public resources requirements and a focus on significant improvements in quality (better pedagogical supervision).

Table 3 provides a summary of the main assumptions and results of the three projection scenarios.

Table 2. Summary of the Main Assumptions and Results of the Projection Scenarios

	Baseline	Scenario 1	Scenario 2	Scenario 3
Assumption				
Students per 100,000 population	1,158	1,200	1,500	1,300
Percentage of student enrollment in public universities	85.6	85.6	85.6	75.0
Student-lecturer ratio - Public	39.5	30.0	20.0	30.0
Share of lecturers to be upgraded (%)	0.0	5.0	5.0	10.0
Percentage of enrollment in short science-based programs	25.1	25.1	25.1	50.0
Domestic revenue voted to recurrent education expenditure (%)	28.3	28.3	28.3	30.0
Choice of financing (traditional unit cost versus DUC method)	1	1	2	2
Percentage of students in private university financed by the public	0.0	0.0	10.0	10.0
Result				
Enrollment				
Public 2020	—	499,600	543,822	498,761
Public 2025	—	563,265	696,218	557,339
Public 2030	—	628,362	813,759	618,199
Lecturers				
Public 2020	—	12,638	16,151	13,601
Public 2025	—	14,249	29,123	17,468
Public 2030	—	15,896	40,688	20,607
Recurrent costs (KES, billions)				
Average 2018–2019	—	103,725	140,839	137,075
Average 2020–2025	—	120,280	170,669	153,034
Average 2026–2030	—	165,452	223,520	189,044
Likely financing (KES, billions)				
Average 2018–2019	—	105,138	105,138	106,910
Average 2020–2025	—	132,457	132,457	140,917
Average 2026–2030	—	178,662	178,662	198,639
Resource gap (KES, billions)				
Average 2018–2019	—	1,413	–35,702	–30,164
Average 2020–2025	—	12,178	–38,212	–12,117
Average 2026–2030	—	13,211	–44,857	9,595

The results vary with each of the three scenarios in terms of development prospects for higher education and related financing requirements. Scenario 1 shows a financial surplus of KES 8 billion, or about 5.4 percent of projected costs. The low enrollment growth rate and high student-to-teacher ratio limit the sector’s financial needs, which are growing at a rate of 5 percent per year while potentially maintaining the sector’s share at 23 percent of current expenditure on education and relying on average economic growth rate of 5 percent and a slight increase in the weight of domestic resources in GDP (from 18.5 percent in 2017 to 20 percent in 2020).

Scenario 2 translates into a large deficit. It reaches an annual average of KES 43 billion, or 23 percent of the sector’s total financing needs. This is the result of an increase in spending at a rate of 7.1 percent per year while resources continue to grow at a rate of 5.6 percent only. This deficit situation proves to be fiscally unsustainable and calls for revising the assumptions of the projections to get closer to financial equilibrium.

Scenario 3, which retains a more moderate expansion assumptions than Scenario 2 and introduces elements of quality improvement, reduces the financial deficit to KES 9 billion, or 5.5 percent of financing needs. Compared to Scenario 2, the funding gap is reduced by an average of KES 34 million per year. Its complete resorption would require other measures or a more favorable economic situation, as demonstrated by the sensitivity tests that were run along with the elaboration of the scenarios.

Based on the results of these three scenarios, it is clear that the success of the Kenyan government's plans for consolidating and further developing its higher education system will hinge, to a large extent, on the availability of sufficient financial resources on a sustained basis and the ability to apply allocation methods that are not only equitable but also effective in encouraging innovation and promoting an efficient use of public resources among higher education institutions.

Institutional differentiation. A growing number of nations have recognized that rapid growth of enrollment cannot be achieved only by following the traditional mode of building and funding new public universities with budgetary resources but also by relying on increased institutional differentiation. Thus, even though it is not a financial measure per se, spreading enrollment growth across a variety of higher education institutions and delivery modalities—public and private, on-campus, and online—instead of simply expanding the public university subsector can be an effective strategy for achieving greater enrollment targets in a more financially manageable way from a public resource perspective.

Strengthening the TVET subsector will require significant efforts to train instructors more thoroughly, establish close links to industry, modernize the training infrastructure, and deploy existing resources in the most efficient way. Looking forward, the Kenyan government may consider transforming the local youth colleges into post-secondary community colleges based on the North American or Korean model.

The plan to set up the OUK could signal the availability of new learning opportunities for hundreds of thousands of Kenyan youths and adults. To make sure that the OUK operates as a leading-edge online institution, its leadership team could learn from the experience and business model of other successful online institutions, such as Western Governors University (WGU) in the United States, which pioneered a competency-based curriculum.

The Kenyan government's decision to promote the expansion of private higher education as an integral part of its higher education development strategy is a positive development. Having made students enrolled in private institutions eligible for Kenyan Higher Education Loans Board (HELB) loans goes a long way toward reducing the financial barrier faced by low-income students. Along the same lines, the new practice of the Admission and Placement Board to orient some students toward private universities signals strong support for that subsector.

To further facilitate the development of a good-quality private sector, the Kenyan government can envisage two sets of measures. First, in terms of regulatory framework, it is important to remove any legal or administrative hurdle that may constrain the establishment and operation of good-quality private higher education institutions. Second, in the medium term, Kenya could consider the possibility of offering additional subsidies to those institutions in the private sector that fully meet quality standards.

Resource mobilization. The Government of Kenya would be well advised to consider two fundamental issues as it seeks to guarantee the financial sustainability of the higher education system while also improving the equity situation. The first one is the tuition fee policy. The most equitable and sustainable approach would be to eliminate the present parallel fee system and move instead to a Targeted Free Tuition (TFT) scheme, following the example of Chile and South Africa. This would require shifting from a system of fee exemptions that benefit the most qualified students from an academic viewpoint—often from wealthier families—to a system where the neediest students who qualify for higher education studies would not pay tuition fees.

The second policy issue worth considering is the design and operation of HELB, the national student loan scheme. HELB policies for granting bursaries and loans ought to mirror the proposed tuition fee approach. Priority should be given to extending bursaries and loans to needy students and providing loans to middle-class students. Strengthening HELB would require actions on three fronts: (a) better targeting, (b) resource mobilization, and (c) improved loan recovery, preferably through an income-contingent approach.

In addition, Kenyan universities could actively seek additional resources through donations, contract research, consultancies, continuing education, and other fund-raising activities, as some of them have already done since the government started reducing university budgets in the mid-1990s. Not all sources of income have the same potential. Contrary to what is commonly assumed, technology transfer is not, on average, a highly beneficial activity from an income generation viewpoint, even though it is very useful to strengthen linkages with the economy and make university research more relevant.

International experience suggests that providing continuing education, undertaking productive activities, and raising funds from alumni and corporations are the three most important income generation sources for universities. Social innovation approaches also offer promising avenues for mobilizing additional resources and reducing disparities in higher education. In South Africa, the Ikusasa Student Financial Aid Programme (ISFAP) has included in its funding strategy the idea of raising resources through social impact bonds, which are public-private partnership with the aim of funding effective social services through a performance-based contract.

Resource allocation. Rather than continuing to allocate annual budgets to the public universities on the basis of history, an adequate model for allocating public funds for higher education in Kenya would be well served to apply the following eight principles: (a) close alignment with national priorities, (b) explicit link to performance, (c) equity among all population groups, (d) objectivity and transparency in the allocation process and criteria, (e) consistency and compatibility among the various financing instruments in use, (f) stability over time, (g) institutional autonomy and accountability, and (h) allocation as a block grant (already practiced in Kenya).

With these principles in mind, the Government of Kenya could introduce a combination of performance-based budget allocation mechanisms that would provide financial incentives for improved institutional results and better alignment with national policy goals. Policy makers may consider the following three types of innovative allocation mechanisms, separately or combined, to achieve this purpose: (a) funding formula, (b) performance contracts, and (c) competitive grants. One of the most transparent and objective methods of distributing funds for recurrent expenditures is to use a mathematical formula linking the amount of resources allocated to indicators of

institutional performance such as the number of graduates, the employment rate of graduates, and/or the research output.

Performance contracts are nonbinding regulatory agreements, negotiated between governments and tertiary education institutions, defining a set of mutual obligations. In return for the participating universities' commitment to meeting the performance targets established in the agreement, the government provides additional funding. The agreements may be with several or all institutions in a given tertiary education system or with a single institution. All or a portion of the funding may be conditional upon the participating institutions meeting the requirements in the contracts. The agreements can be prospectively funded or reviewed and acted upon retrospectively.

Finally, competitive funds have proven their value and strength as an effective resource allocation mechanism for transformative investment purposes. Under this approach, universities are invited to formulate project proposals that are reviewed and selected by committees of peers according to transparent procedures and criteria. Positive experience in countries as diverse as Chile, China, Egypt, Indonesia, and Tunisia has shown the ability of competitive funds to help improve quality and relevance, promote pedagogical innovations, and foster better management, objectives that are difficult to achieve through funding formulas. The Government of Kenya could consider piloting a competitive fund as a channel for allocating public investment funds to support attempts to improve the performance and quality of higher education institutions, emulating the strategy adopted by the World Bank to select the African Centers of Excellence.

Improving Quality and Relevance

Improving the quality and relevance of Kenyan higher education institutions requires a combination of interventions: (a) better preparation of incoming students, (b) enhanced qualification of academics, (c) innovative curricular and pedagogical practices, (d) closer links to industry, and (e) increased internationalization.

Incoming students. The Government of Kenya could improve the chances of incoming students through the following four measures. First, one of the priorities should be to strengthen math and science education at the high school level and encourage more students to view STEM programs as attractive careers. Putting in place mentoring activities and scholarships targeting girls is particularly important to ensure gender balance in STEM programs. Second, a solid and comprehensive system of academic and career counseling represents an essential instrument to improve the transition from high school to higher education, especially for students from underprivileged backgrounds who often lack the information and motivation to pursue their studies. Third, along the same lines, programs that link higher education institutions to the lower levels of education through outreach and bridge activities can also be effective in improving transition rates and raising the probability of success in higher education. Finally, the universities can offer foundation courses to allow students to catch up on subjects where they have weaknesses.

Qualification of academics. To meet the growing demand for qualified academics and the shortfall in PhD holders, the universities can address staffing needs in the following ways: (a) expanding master's and PhD programs to hire their graduates into the system; (b) training Kenyan students abroad; (c) attracting expatriates with the required qualifications (providing higher remuneration packages compared to their Kenyan colleagues); and (d) covering staff gaps through

the contracting of academic staff on a part-time basis in other universities, in addition to their work in the primary employing institution.

Innovative curricular and pedagogical practices. The Kenyan authorities must encourage the universities to move away from traditional teaching methods and make teaching and learning more interactive, collaborative, and experiential. The establishment of well-resourced Teaching and Learning Centers in all higher education institutions should become a priority in support of pedagogical innovations that would facilitate active learning (design-based or problem-based learning, gaming, simulations, role playing, peer-to-peer learning, artificial intelligence software for independent learning, and so on).

Closer links to employers. Strengthening links with industry is an effective way of increasing the relevance of higher education programs. The Kenyan universities could use a large variety of mechanisms, including internships for undergraduate students, in-company placements of research students and academics, and practitioners from industry as visiting lecturers. Incorporating training for entrepreneurship into regular university programs can also help bring them closer to the productive sectors. Finally, universities may consider establishing cooperative learning programs that alternate on-campus learning periods and regular in-firm internships.

Internationalization. In a world that is becoming more interconnected and interdependent every day, internationalization is one of the key instruments to improve quality and relevance and prepare graduates capable of working as global professionals and living as global citizens.

Internationalization means, among other things, effectively equipping graduates with the wide range of knowledge, skills, and competences required in the global economy; conducting internationally competitive research; and attracting international students and professors. Internationalization of higher education is more than just signing collaborative agreements with foreign institutions and exchanging students and academics. It involves embedding the international dimension in all aspects of teaching and research, at both the national and institutional levels.

Strengthening the Quality Assurance System

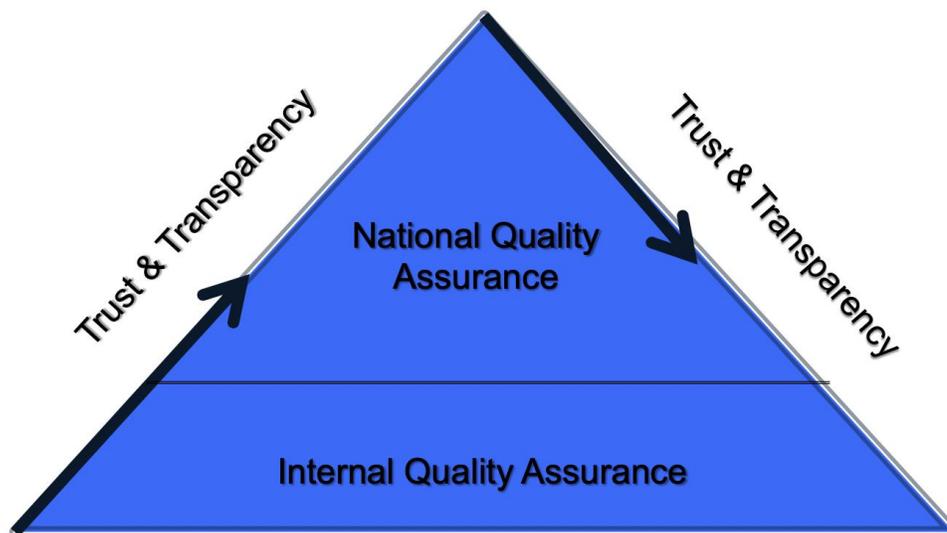
The Kenyan government's efforts to further consolidate its QA system could be guided by the following seven principles, proposed in 2015 by the CHEA International Quality Group:

1. **Quality and higher education providers.** Assuring and achieving quality in higher education is the primary responsibility of higher education providers and their staff.
2. **Quality and students.** The education provided to students must always be of high quality whatever the learning outcomes pursued.
3. **Quality and society.** The quality of higher education provision is judged by how well it meets the needs of the society, engenders public confidence, and sustains public trust.
4. **Quality and government.** Governments have a role in encouraging and supporting quality higher education.

5. **Quality and accountability.** It is the responsibility of higher education providers and QA and accreditation bodies to sustain a strong commitment to accountability and provide regular evidence of quality.
6. **Quality and the role of QA and accreditation bodies.** QA and accreditation bodies, working with higher education providers and their leadership, staff, and students, are responsible for the implementation of processes, tools, benchmarks, and measures of learning outcomes that help create a shared understanding of quality.
7. **Quality and change.** Quality higher education needs to be flexible, creative, and innovative, developing and evolving to meet students' needs, to justify the confidence of society and to maintain diversity.

The Kenyan authorities are fully aligned with these principles, especially the first one mentioned above, as they recognize the importance of combining efforts at the national and institutional levels: “the Commission recognizes that quality and quality control are primarily the responsibility of higher education institutions themselves but they partner with the Commission for better results.”¹ Figure 3 illustrates this complementarity, which can operate successfully only if the relationship between the state and higher education institutions is based on trust and transparency.

Figure 3. Features of an Aligned QA System



Source: Elaborated by Jamil Salmi.

Three issues must be addressed to strengthen the existing QA system. The first one is about the need for preserving the professional independence of the main QA agency. CUE, as the Ministry of Education's main arm for overseeing the university sector, has many important roles. It is expected to make policies, plan, monitor the performance of the university sector, regulate public and private universities, and communicate government policies to stakeholders, regarding university education in Kenya. In the spirit of independence that characterizes well-performing

¹ <http://www.cue.or.ke/index.php/faqs>.

QA systems, it would be advisable to place the evaluation and accreditation functions of CUE at arms-length from its other policy-making, planning, and regulatory functions. Establishing a stand-alone accreditation body might be the best way of achieving this goal as this would keep the policy-making and QA roles clearly separate.

Institutional capacity is a second issue that merits careful consideration. Whatever configuration the Kenyan government opts to implement, one of the main challenges will be to provide the financial and technical capacity to undertake all the tasks involved in QA compliance and enhancement in an efficient and effective manner. Furthermore, if CUE is to fulfill its entire mandate as envisaged by the 2012 Act, it will need to move beyond institutional accreditation and also accredit all university programs. This is a daunting task. The University of Nairobi alone has 371 programs, and accreditation is not a once-in-a-lifetime activity. Accredited programs will need to be reaccredited after some defined time, especially in the STEM areas. It is therefore indispensable to substantially strengthen the capacity of CUE to carry out the program accreditation at a reasonable pace.

In parallel, the Kenyan government should consolidate existing QA mechanisms and align their delivery capacity with the rhythm of creation of new institutions and programs. It may also consider the option of delegating the accreditation responsibility for specific programs to independent professional associations and organizations, following the model in place in Mexico and the United States. In this approach, the main role of the national QA agency would be to accredit the professional accreditation bodies. This is already happening in a way in Kenya. At present, some programs such as engineering, law, and pharmacy, must be accredited by the relevant professional bodies before CUE can approve them. But rather than having a two-step procedure that involves some degree of duplication and lengthens the process, CUE could just delegate entirely to these professional bodies the responsibility for evaluating and accrediting all programs in their professional ambit.

To complement its efforts at the national level, the Kenyan government should also consider offering incentives for the establishment and/or consolidation of internal QA units in all higher education institutions, which are essential for the development of a genuine and effective QA culture. An appropriate internal QA system includes the following aspects: (i) detailed information provided to all students on the institution's study programs, (ii) a good management information system that collects information about student profiles, (iii) evaluation procedures to cover, at the minimum, the quality of teaching and learning and the learning resources, (iv) structures to support such procedures, with a centralized QA unit and QA officers in each faculty, (v) processes to ensure wide ownership and engagement in QA processes, (vi) processes to ensure links with strategic management and planning through the use of key performance indicators, and (vii) transparency at all levels.

Constructing a Comprehensive Labor Market Observatory (LMO)

The Government of Kenya would be well served to put in place a LMO tasked with collecting and analyzing the employment results of all graduates. This would provide prospective students, university leaders, and employers with relevant information about labor market trends, employment characteristics of graduates, and changes in occupations.

One of the main challenges faced by LMOs is the lack of coordination among relevant government agencies. To avoid this kind of limitation, it would be important for Kenya to design a system that builds on existing information systems and puts together the various sources of labor market information that can guide universities, students, and employers with respect to the relevance of existing programs and the labor market experience of graduates. This would imply close collaboration among the Department of Labor within the Ministry of Labor and Social Protection, the Ministry of Education, Science, and Technology, and CUE at the national, regional, and local levels.

Leveraging Technology to Increase Coverage and Improve Quality

Innovative universities in other parts of the world have demonstrated good practices in building, implementing, and scaling up digital programs, as a way of addressing challenges similar to those faced by the Kenyan higher education system. Examining how these institutions have designed and implemented such strategies and models can provide useful lessons that Kenya can learn from to deliver its priorities and programs. The five core initiatives for the government to consider in that respect are

1. **Investing in expertise in online course development**, including in instructional design competencies, and establishing cross-functional teams with clear support from the universities' leadership. International experience reveals the following good practices in the development of online education:
 - Innovate from the top. Outline a clear vision for the institution and where online learning fits into that vision; recruit innovative leaders; and foster a culture of innovation by rewarding creative ideas, piloting new initiatives, and enabling staff to make mistakes as part of the learning experience.
 - Invest in infrastructure. Equip learning spaces and areas where students will do homework with high-speed Internet; provide access to labs and learning centers with computers for students who do not have Internet access at home; redesign learning spaces for active learning in groups.
 - Centralize expertise. Build a central team with cross-functional expertise to deliver online courses and implement a master course model for course development.
 - Build human capital - especially in instructional design competencies. Invest in competencies required for successful course development - including instructional design, digital tool development, and practical research capacity.
 - Develop a framework for university-student interaction. Provide a mentorship structure and community-focused features for online students.
 - Provide ongoing professional development. Partner with faculty throughout the course creation process and ongoing implementation and provide ongoing training.

- Optimize content for mobile. Create materials to engage the growing numbers of students accessing content on mobile devices.
 - Evaluate course-building and delivery vendors/partnerships. Determine how external partners or vendors (including MOOC providers) can supplement an internal team if necessary:
 - Drive iterative improvements with data. Outline desired success metrics, measure outcomes, and have a plan for putting research into action.
2. **Developing student support structures**, including investment in mentorship, while leveraging technology to improve retention and student success. In particular, Kenyan universities could embrace predictive analytics as a promising avenue for identifying at-risk students and reducing dropout rates, especially among first-generation students. This would involve the following actions, based on international experience.
- Build a team of mentors. Connect students to the university culture, and guide them with tips, motivation, and support through virtual mentorship; each student should have regular interaction with a mentor through calls, emails, and text messages.
 - *Leverage data and AI.* Develop a data portal for mentors to access student performance, attendance, and engagement data; predictive analytics systems can provide early intervention flags.
 - Use mobile devices to meet students where they are. SMS mentorship initiatives can help with course content, motivation, study tips, and course management.
 - Focus mentorship on STEM students and match students to relatable mentors. Cultivate and scale the limited expertise in these fields; match female and minority students with mentors who have similar backgrounds.
3. **Innovating in program design through the use of open educational resources (OER)**, with more modular and personalized content. This would require the following actions:
- Budget for up-front investment. Allocate funds to course development; costs for implementing an OER course in the United States average US\$11,700.
 - Build instructor capacity to develop OER courses and equip course-building teams with tools and resources for success. Support course design teams with training and share knowledge with institutions that have developed OER courses; analyses of course development activities showed that courses took an average of 172 hours for instructors to develop.
 - Build a collaborative team, including instructional designers and technologists, to create a dynamic student experience and smooth delivery around OER content.

- Create an OER community. Develop a central portal to help generate awareness, build the reputation of OER content, and scale good practices. Institutions can also share the quality content they have curated from OER textbooks and across other sources (including YouTube), saving time on future course development.
 - Implement Quality Assurance Measures. Create a process for ensuring that OER materials have high instructional and engagement value; this process may include a rubric for assessing materials and a peer review process.
 - Integrate best practice pedagogy. Examine course pedagogy in the course redesign process, developing good practices in active learning and flipped classroom models.
4. **Innovating in program delivery by leveraging online learning to serve working adults with flexible options** and more modular qualifications structures (use of certificates and badges), in collaboration with industry partners.
- Determine content chunks and map credentialing pathways. Create a series of badges and certificates that represent valuable knowledge acquisition and determine how these credentials can build for further certificates or degrees.
 - Ensure job relevance. Work with employers to determine a set of badges and certificates that demonstrate value in the market.
 - Establish cross-institutional links. Establish links through competencies across settings—from secondary education, through informal learning, through community colleges, and through universities.
 - Motivate educators with badges. Determine a system of badges that can upskill educators on key topics around STEM and teaching with technology.
5. **Providing practical ICT skills education through partnerships with coding education providers**, hubs, and industry leaders. Good practices in this emerging area include the following aspects:
- Implement coding education programs. Consider partnering with coding boot camp providers through various business models: current students can receive course credit and discounted rates; certain introductory courses can be delivered for free; and recent graduates can connect with future employment opportunities.
 - Establish standards. Create evaluation standards for coding boot camps to ensure that students enroll in, and institutions partner with, vetted programs.
 - Build 21st century skills. Foster critical social and emotional skills for the workforce, including critical thinking, creativity, problem solving, and collaboration.

- Upskill educators. Design a program for primary, secondary, college, and university educators to also go through these coding boot camps, bolstering their abilities to teach these subjects.
- Support upskilling and hiring initiatives with funding. Enable students who receive financial assistance to access vetted coding education programs; provide grant initiatives that can fuel communities to improve the hiring process; and explore new financing models for students to pursue rapid-growth fields.

Strengthening University-based Research and Technology Transfer

Talent development. The most important element in any university’s strategy to strengthen its research capacity is its ability to attract and retain top-rate academics—young promising researchers and experienced proven researchers—who can contribute to building critical mass of excellence in research and knowledge transfer. While strong research groups can be found in a number of Kenyan universities, those with the potential to become more research intensive need to have a clear capacity-building program in place and provide adequate incentives to encourage and reward high-impact research. These incentives, which would signal a cultural shift in favor of research, could include financial rewards for good research performance; flexible schedule arrangements that would allow productive researchers to have a reduced teaching load, especially those linked to Centers of Excellence; and opportunities for academic mobility and participation in international research networks.

To improve gender equity and thus avoid talent loss, the university leadership teams ought to put in place special programs to attract more qualified female academics into research, combining financial and nonmonetary measures to remove existing obstacles.

Links with the economy and the regions. The leading Kenyan universities must strengthen their research and development activities to build their capacity to engage with the local economy and support the national and regional innovation system. Indeed, the presence of strong universities is important to regional development, through both direct links and spillover effects. Universities can be essential economic agents through relevant applied research and the training of highly qualified professionals who can help make the local firms more innovative and productive. The Kenyan universities can fulfill this role in several ways, not only by participating in new innovations but, more importantly, by facilitating technology upgrade and absorption.

By setting up their own incubators or linking up closely with the industrial parks under development, the strongest Kenyan universities could contribute innovative ways of producing goods and services. This would require systematic efforts to undertake industry-oriented research and seek opportunities for technology commercializing.

By opening their doors to firm representatives and organizing technology information and diffusion events, the universities can act as knowledge exchange platforms, which, despite the often-informal character of interaction between academics and industry people, can have a significant technology transfer influence on industry and services.

Finally, entering a few strategic partnerships—rather than signing hundreds of memoranda of understanding (MOUs)—can help accelerate capacity-building efforts to strengthen the research and technology transfer of Kenyan universities. Strategic partnerships are deep relationships with carefully chosen institutions that are not necessarily at the same level of development but share a common vision and similar values. The principal objective of such partnerships is to undertake common activities in research and knowledge transfer that are mutually beneficial.

Stakeholder Consultation

The World Bank team presented a first draft of the Policy Report at a dissemination workshop that took place in early May 2019 in Nairobi. The stakeholders, including Ministry of Education and University Commission officials, vice-chancellors, and senior university leaders, as well as representatives of relevant national and international organizations, responded positively to the analysis and messages of the Policy Report. The workshop echoed most of the options outlined in the Policy Report, recognizing the need for reforming the Kenyan higher education subsector through the implementation of sustainable financing models, strengthening university-based research and technology transfer, leveraging technology for greater access and enhanced quality, and improving quality assurance systems and processes.

Chapter 1. Introduction

1.1 Background

Sub-Saharan Africa has an enormous development potential. With a total population of more than a billion people in 2018, it is expected to become the most populated continent in the world by the end of the century. Kenya is the sixth most populated country and the fifth economy in Sub-Saharan Africa. And yet, the country's development trajectory has not matched its potential. In 1980, when China emerged from the Cultural Revolution, its per capita gross domestic product (GDP) was only US\$200, much smaller than Kenya's US\$450. Today, however, China is at US\$6,900 and Kenya is three-and-a-half times less wealthy at US\$1,800.

The 2018 World Development Report on the transformation of labor markets outlines important changes brought about by the digitalization of the economy in the context of the 4.0 Economic Revolution (World Bank 2018). First, the boundaries of the traditional firm are becoming blurred, as illustrated by the rapid growth of platform marketplaces that connect customers, producers, and providers in new ways. Second, technology is reshaping the demand for skills. Technological change is driven, to a large extent, by the development of digital firms, which require well-qualified information and communication technology (ICT) specialists and technicians trained locally. This evolution, in turn, provokes the transformation of many jobs in traditional firms. Growth in economic activity and jobs is stronger in countries that are experiencing accelerated technological advances.

These trends are reflected in the changing demand for skilled labor. The World Development Report found that, while the demand for low skills profiles is declining, "the demand for advanced cognitive skills, socio-behavioral skills, and skill combinations associated with greater adaptability is rising" (World Bank 2018, 6).

Faced with this evolution, emerging economies such as Kenya have no choice but give a higher priority to human capital development.

Investing in human capital is the priority to make the most of this evolving economic opportunity. Three types of skills are increasingly important in labor markets: advanced cognitive skills such as complex problem-solving, socio-behavioral skills such as teamwork, and skill combinations that are predictive of adaptability such as reasoning and self-efficacy. Building these skills requires strong human capital foundations and lifelong learning (World Bank 2018, 13).

Kenya's results in the Human Capital Index (HCI), a new measure of countries' human capital capacity launched in 2018 by the World Bank, are relatively satisfactory. At 0.52 in 2017, Kenya's HCI is higher than the average for its region (0.40) and income group (0.48), with females doing slightly better than males. Ranked 94 out of the 157 countries for which data are available, Kenya has the third-best score among all Sub-Saharan African countries, after the Seychelles (43) and Mauritius (52), and well ahead of South Africa (124). But there is room for improvement. The country's HCI of 0.52 means that the expected productivity, as a future worker, of a child born

today in Kenya is only 52 percent of what it could be with complete basic education and full health. Kenya's Human Development Index (HDI), which aggregates education, inequality, and life-expectancy indicators, rose by 0.07 points between 2002 and 2015.

A recent assessment of the rising demand for skills in Africa, prepared by the World Economic Forum (2017), indicates that many employers in Sub-Saharan Africa view an inadequately skilled labor force as a major constraint. The 2013 World Bank Enterprise Survey showed that 30 percent of Kenyan firms reported an inadequately educated workforce as a major obstacle to their operations and growth, compared to only 3 percent when the 2007 Enterprise Survey was administered. Similarly, the 2017/18 global competitiveness index identified insufficient capacity to innovate, poor work ethics, and an inadequately educated workforce as some of the most challenging factors for doing business in Kenya.

The skills shortages are often because a growing proportion of jobs in the region are becoming ICT intensive. The World Economic Forum predicts that 52 percent of all work activities in Kenya are likely to be automated in the next few years, compared to 44 percent in South Africa and 46 percent in Nigeria. Statistics reveal that jobs with high ICT intensity represent 18.4 percent of all formal sector employment in Kenya, compared to 6.7 percent in Ghana.

On the positive side, Kenya is widely regarded as the leading ICT innovation hub in Sub-Saharan Africa. Since 2010, GDP growth has averaged 5.6 percent, which is 1.8 percentage points higher than the average for Sub-Saharan African countries during this period (3.8 percent) and 2.0 percentage points higher than the growth rate of the Kenyan economy in the previous decade (3.6 percent growth). Though all sectors have contributed to the increase in growth, the rapid increase in the services sector (especially the ICT and financial subsectors) has accounted for more than half of the increase in GDP growth, followed by industry and to a lesser extent the agriculture sector, which has faced productivity challenges.

Kenya is ranked one of the fastest growing digital economies with high momentum and potential for growth. For example, Internet users increased by 125 percent from 16 million users in December 2012 to an estimated 36 million in December 2015 while mobile phone subscriptions grew from 31 million in 2012 to 38 million by December 2015, increasing the mobile phone penetration ratio from 78 percent to 88 percent. About 25 percent of digital innovation start-ups in Africa are based in Kenya. Expansion in services such as financial intermediation and mobile communications has stimulated demand for other services such as trade. The economy is experiencing a transformation characterized by a sectoral shift—including innovation and technology, demographic transition, and urbanization. This shift to nontraditional priority sectors for economic growth demands high-order skills not only in technical competence but also in critical fields such as digital literacy. The people with the most advanced skills will be better able to use the new technologies and, therefore, adapt to the evolving nature of work.

The World Economic Forum carried out an analysis of job growth in partnership with LinkedIn, showing that the professions most in demand on the continent include the creative industries; food technologists; 3D designers; data center workers; and care, education, and health workers. They estimate that, in the long term, the strongest growth potential lies with jobs in hard and soft infrastructure, in the green economy, and in the ICT sector.

The greatest long-term benefits of ICT intensive jobs in the region are likely to be not in the lower-skilled delivery of digital products or services but in digital design, creation and engineering. To build a pipeline of future skills, Africa's educators should design future-ready curricula that encourage critical thinking, creativity and emotional intelligence as well as accelerate acquisition of digital and STEM skills to match the way people will work and collaborate in the Fourth Industrial Revolution (World Economic Forum 2017, iii).

Against this background, Kenya's development efforts for the next few years, articulated in the 'Big Four Agenda', aim to enhance the country's competitiveness in line with Vision 2030 and to transform the lives of all citizens by (a) creating jobs in manufacturing, (b) improving living conditions through affordable housing, (c) raising the health status through universal health care, and (d) ensuring food and nutrition security based on a profitable use of land.

In 2018, the government formulated a five-year National Education Sector Strategic Plan education plan (NESSP, 2018–2022), which includes priority areas for investments in higher education in line with Vision 2030's overarching goal of making Kenya a competitive economy. Building on the positive results of the Economic Transformation Agenda implemented over the NESSP gives priority, among other key areas, to technology innovation to boost economic growth and to vocational training and higher education with the aim of helping young people find jobs. Specifically, the plan proposes the following key objectives:

- Increase the gross enrollment ratio in university education from 7 percent to 15 percent.
- Enhance the quality and relevance of training and research.
- Increase access to science, technology, engineering, and mathematics (STEM) programs to 60 percent of the student population.
- Create opportunities for academic staff to acquire PhDs and appropriate pedagogical skills.
- Establish the Open University of Kenya (OUK) (30 percent of degree programs available through an e-learning mode by 2022).
- Enhance equity and inclusion in university education, especially for females and students from low-income families.
- Strengthen governance and management of university education.

Thus, the Kenyan government is fully aware that, to bring about sustained economic growth, innovation is needed across the entire economy to fuel competitiveness through improved productivity and increased exportability of goods and services. Skills development and a stronger university research capacity are key elements of this strategy.

The Kenyan higher education system can contribute specifically to the long-term prosperity of the nation by (a) training a qualified and adaptable labor force, including high-level scientists, professionals, technicians, teachers in basic and secondary education, and future government, civil

service, and business leaders; (b) generating new knowledge through basic and applied research; and (c) providing the platform for accessing existing stores of global knowledge and adapting this knowledge to local use. Higher education institutions are unique in their ability to integrate and create synergy among these three dimensions. Sustainable transformation and growth throughout the economy are not possible without the capacity-building contributions of an innovative higher education system (Salmi 2017).

Higher education enrollment has been rapidly increasing in Kenya in the past decades. The number of universities and colleges climbed from 31 in 2009 to 68 in 2014, and the net enrollment rate increased to 7.5 percent in 2014 from 4 percent in 2009. Technical and vocational education and training (TVET) enrollments grew from 80,000 students in 2009 to about 150,000 in 2013. At the university level, the net enrollment rate increased to 7.5 percent in 2014 from 4 percent in 2009.

This fast growth has created a tension between the social demand for further expansion and the need to improve quality and relevance through appropriate programs and effective learning models. One of the main challenges, therefore, is to mobilize the resources needed to support the Kenyan government’s ambitious plans to expand and improve higher education. Table 1 shows the shortfall experienced by both public and private universities.

Table 3. Income and Expenditure (KES, millions) - Academic Year 2013/14

	Income				Total	Expenditure	Deficit
	Government Capitation	Student Fees	Research Grants	Other Incomes			
Public	133,398.26	117,922.89	14,495.33	13,801.49	279,617.98	281,487.54	1,869.56
Private	0	53,804.88	1,480.64	11,009.70	66,295.22	73,418.00	7,122.78
Total	133,398.26	171,727.78	15,975.97	24,811.19	345,913.20	354,905.54	8,992.34

Source: State of University Education in Kenya 2016.

Addressing this challenge may be difficult in the present fiscal context. Even though the share of public expenditures going to higher education has grown in recent years, from 15.5 percent in 2013/14 to 22.7 percent in 2018/19, it has barely kept pace with the rapid increase in the number of public universities. There is a sense that it will be difficult, if not impossible, to continue increasing the volume of public resources allocated to higher education. This has led the vice-chancellors of public universities to express their concern over a looming ‘cash crisis’ (Nakweya 2019a). While the university leaders have called for fee raises to keep up with the financing needs of their institutions, the students have strongly rejected any increase.

Very few countries in the world, rich or poor, industrial or developing, have managed to define and put in place a sustainable financing strategy. The success of the Kenyan government’s plans for strengthening and further developing its higher education system will hinge, to a large extent, on the availability of sufficient financial resources on a sustained basis and the ability to apply allocation methods that are not only equitable but also effective in encouraging innovation and promoting an efficient use of public resources among higher education institutions.

1.2 Purpose of the Policy Report

Against this background, the policy report seeks to explore a range of options for designing and implementing a sustainable higher education financing strategy in Kenya, improving the quality and relevance of existing higher education institutions and programs, and leveraging technology to achieve the twin goals of quantitative expansion and quality improvement. This involves careful consideration of the following key questions:

- **Expansion scenarios.** Are available resources sufficient to support the likely expansion of the higher education system in the next two decades? What are the policy implications of the various scenarios considered?
- **Shape and size of the system.** What institutional configuration would allow for a balanced and financially sustainable expansion of the higher education system? What is required to make this configuration a viable option?
- **Resource mobilization.** How can public and private funding sources be mobilized in the most effective manner? How can financial barriers be effectively removed for students coming from poor and vulnerable groups?
- **Resource allocation.** What are appropriate mechanisms to distribute public resources in a manner that rewards improved performance, promotes innovation, and encourages efficient use of available resources?
- **Quality and relevance.** How successful are the Kenyan higher education institutions in training highly-qualified graduates who perform well in the labor market? Is the national quality assurance (QA) system adequately fulfilling its regulatory and quality enhancement missions? What could the Kenyan higher education institutions do to improve their curriculum and pedagogical practices? What is needed to increase the effectiveness of the QA system? How can the country build a reliable and useful labor market observatory (LMO)?
- **Harnessing technology.** How can Kenyan universities learn from successful developments in the use of modern technology to leverage online platforms and resources as effective ways of increasing access and improving quality/relevance?

The selection of the areas of focus of this Policy Report was informed by the policy priorities expressed by the Kenyan government. It also considered the themes already covered in the 2016 World Bank report. That report, entitled ‘Expanding Tertiary Education for Well-Paid Jobs - Competitiveness and Shared Prosperity in Kenya’, extensively analyzed the governance structures and processes in place in the higher education system and reviewed good practices in the area of student loans.

1.3 Methodology and Scope

This Policy Report is principally informed by a literature review of existing documents on various dimensions of higher education in Kenya and recent developments on the global scene with a focus on good practices in three main areas: financing of higher education, improvements in quality and

relevance, and use of technology to increase coverage and enhance the quality of higher education programs.

With respect to the Kenyan situation, the report relies on the following sources:

- Official publications and policy documents of the Kenyan government, as well as regional reports (Association of African Universities [AAU]; African Development Bank [ADB]; United Nations Educational, Scientific, and Cultural Organization [UNESCO]) and relevant studies produced by the Organisation for Economic Co-operation and Development [OECD] and the World Bank
- Recent academic works on higher education reforms in OECD countries and Kenya
- National, regional, and international statistics on higher education performance and financing

The policy options considered in this report are based on careful consideration of relevant international experience from countries facing similar challenges as those currently encountered in Kenya. The report considers the extensive feedback received during a consultation workshop with policy makers, university leaders, and other relevant stakeholders, which took place in Nairobi in early May 2019 (see Executive Summary).

1.4 Organization of the Policy Report

The report has three main chapters. Chapter 2 examines the financing situation of the Kenyan higher education system, presents the results of a scenario-building exercise to explore the financial impact of various expansion paths, and proposes a strategy to achieve financial sustainability.

Chapter 3 focuses on the quality and relevance of existing institutions and programs. It starts with an assessment of the present state of Kenyan higher education institutions. It continues with a review of options to strengthen the QA system at the national and institutional levels. Finally, it proposes a road map for developing a well-functioning Labor Market Observatory.

Chapter 4 is a technical note focusing on international developments in the use of technology to increase access and improve quality in higher education. It makes concrete recommendations on how the Kenyan government and university leaders could harness technology in innovative ways.

Chapter 2. Designing and Implementing a Sustainable Financing Strategy

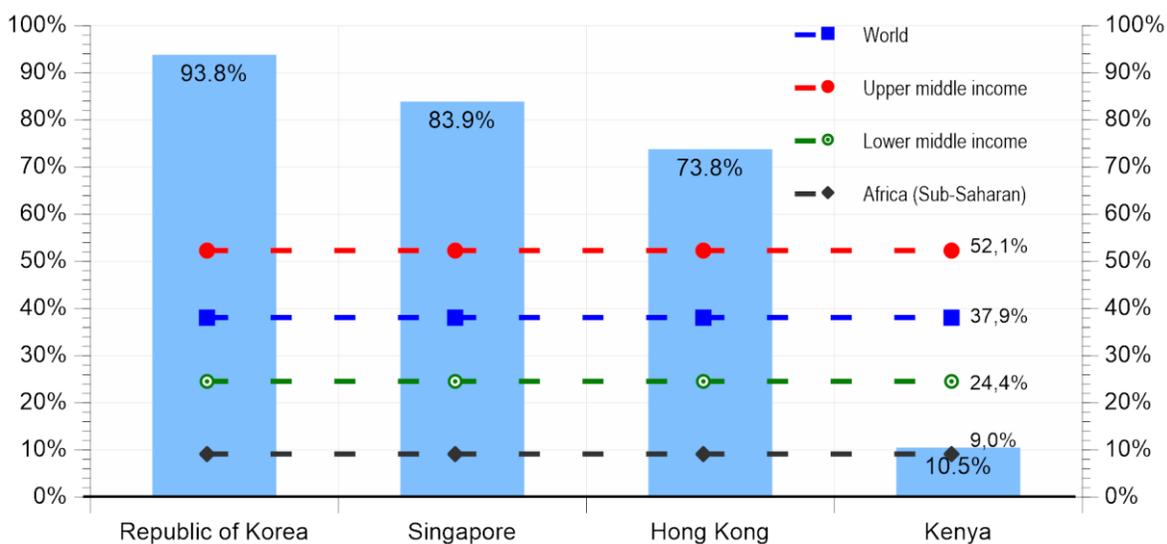
This chapter explores the financing needs of the Kenyan higher education system in the next decades under various expansion scenarios, examines key strategic decisions that influence these financing needs, assesses options for resource mobilization, and proposes ways of allocating public resources considering the performance of recipient universities.

2.1 Expansion Scenarios for the Higher Education System

2.1.1 Present Situation

Although Kenya aspires to be an upper-middle-income economy by 2030, its gross enrollment rate in higher education (11.7 percent) is barely higher than the African average of 9 percent. Moreover, Kenya trails its aspirational countries significantly. Kenya’s Vision 2030 outlines that it aims at achieving standards like Southeast Asian ‘newly industrializing countries’ such as Hong Kong SAR, China; Singapore; Republic of Korea, and Taiwan. However, its gross enrollment rate is considerably lower compared to these countries, with all of them having achieved more than 70 percent in gross enrollment in tertiary education (Figure 1). Benchmarking against countries that Kenya envisions to emulate (Asian Tigers), expansion of higher education is inevitable.

Figure 1. Gross Enrollment in Tertiary Institutions



Source: UNESCO UIS (Institute for Statistics) 2018 and author calculation for Kenya 2018.

The size of higher education is determined by the share of students meeting minimum conditions for admission to universities, which has had dramatic trends in the recent past. The number of students enrolled in Form 4 (final year of secondary) has increased by approximately 55.2 percent over the last six years. However, there was a different pattern in the number of students who scored C+ and above, a sharp decline observed in academic year 2016/17. Although the number of students achieving university admission grades dropped between 2015 and 2016, the number admitted to higher education institutions increased by over 6,000 students before dropping by 3,000 students in 2017 (Table 2). While the admissions in 2017 may suggest a surplus of places in existing institutions, Kenya’s higher education admits students in parallel to the central placement,

the students admitted in the former case being drawn from a different cohort than the one that sits for the examination in the preceding year.

Table 4. Trends in KCSE Performance and University Placements

	Form 4 Total Enrollment	Number Qualified (C+ and above)	Percentage of Candidates with C+ and above	Number of Students Placed by KUCCPS^a	Percentage of Candidates Placed by KUCCPS
2014	482,133	149,717	31.05	56,986	46.84
2015	521,240	169,492	32.52	67,790	46.09
2016	571,161	88,929	15.57	74,046	44.79
2017	610,501	71,018	11.48	71,018	100.00

Source: Economic Survey (2018); Kenya Universities and Colleges Central Placement Service (KUCCPS).

Notes: KCSE = Kenya Certificate of Secondary Examination. a. Placement in the first two academic years (2014/15 and 2015/16) was only for public universities.

2.1.2 Scenarios

Given the present enrollment rates, there is a need to provide more and better graduates to serve the demands of the economy. This section presents a forecast of the higher education landscape for 2019–2030. The choice of the expanded period is consistent with Kenya’s long-term blueprint Vision 2030, to allow sufficient time for aligning plans and finances where the expansion path may deviate from the existing simulation. Some assumed parameters will also require time for execution, for example, when it comes to clearing the stock of existing student population to have a significantly distinct proportion of students in science and arts-based programs, which requires at least a generation of higher education students. The expansion is further predicated on increasing the uptake of students who qualify for university admission from the KCSE to reduce wastage as well as increase the number of students pursuing higher education to match the coverage of countries that Kenya aspire to emulate. While the expansion should be ideally predicated on market demand, the lack of a robust labor market information system limits the expansion discussion to hypotheses built on the growth trajectory travelled by countries that have had similar backgrounds.

The scenarios for the projected expansion rely on three policy levers derived from the National Education Sector Strategic Plan for 2018–2022. With respect to quantitative expansion, the key parameters are (a) the increase in the number of students and (b) the proportion of STEM students. To simulate improvements in quality, the model uses the teacher-student ratio as proxy. The scenarios are built on the following considerations regarding the macroeconomic situation and the evolution of the higher education system.

- **Population.** Overall, population growth is projected to slow down from 2.8 percent to 2.2 percent as per the population policy.² While the policy presents an ambitious decline of natural growth to 15 per 1,000 population (1.5 percent), the simulation has taken a more conservative approach, slowing down the growth rate to 2.2 percent. This means that the population will grow from 46 million in 2017 to 63 million in 2030. The total population

² <http://www.ncpd.go.ke/wp-content/uploads/2016/11/Population-Policy-Popular-Version-English.pdf>.

has been used in the model since the access rate is calculated as the number of students per 100,000 population.

- **GDP.** Although there is a call for more financial independence for higher education institutions, this may not be feasible in the foreseeable future because net funding by the National Treasury still constitutes about 40 percent of the spending in the MTEF. As such, expansion in higher education is sensitive to the expansion of the economy. The real GDP growth is projected at 6 percent in the medium term with a long-term aspiration of 10 percent annual growth. The scenarios assume that the growth will average 6 percent between 2019 and 2030.
- **Domestic revenue excluding loans and grants (tax pressure).** The share of domestic revenue collected relative to GDP determines the level of resources likely to be available for implementation of government recurrent programs. The capital component is not considered because of its volatility (once projects are closed, government priorities easily shift to another sector/subsector). The assumptions on tax pressure are based on the official corporate plan³ of the Kenya Revenue Authority (KRA) that seeks to raise the tax pressure to 19.2 percent by 2021. Thus, the tax pressure is simulated to increase to 20 percent in 2027.
- **Share of recurrent resources allocated to education.** The baseline (2017) of recurrent education spending relative to domestic revenue is 26 percent. Expansion of higher education will be limited by the share that the National Treasury can release to education in the future based on trade-offs with other sectors. This is simulated for each of the parameters to a maximum of 30 percent based on executive commitment.⁴
- **Drivers of the simulation.** At the sector level, the main drivers in the simulation include enrollments in short and long programs in both public and private universities; enrollment into science- and humanity-based programs; student-lecturer ratios; expenditure items in higher education (subsidies, social support to students, and so on); and the application of different approaches of unit costs. The current public private partnership, whereby government facilitates training of students in private universities at the rate of public unit costs, has been included in the simulation.
- **Enrollment in science and humanities.** In the sector policy, the country plans to increase the share of students pursuing science and mathematics programs. This has direct cost implications that are taken into consideration in the scenarios.
- **Unit costs.** The simulations consider both actual costs and the differential unit costing (DUC) method that is being gradually implemented by the Kenyan government.
- **Intra-sector spending.** While inter-sector spending will determine how much resources from the domestic revenue is likely to come to the education sector, the inter-sector sharing

³ <https://www.kra.go.ke/images/documents/7th-Corporate-Plan-FA-Online-version-min.pdf>.

⁴ <http://www.president.go.ke/2018/12/02/kenya-targets-30-percent-allocation-of-national-budget-to-education-president-kenyatta-says/>.

will ultimately determine how much expansion can be pursued from public financing. Each scenario proposes different shares of education recurrent expenditure to be available for higher education.

Three scenarios have been considered:

- **Scenario 1.** Replicating the current situation and maintaining higher education coverage in proportions comparable to what exists now (1,200 students per 100,000 inhabitants).
- **Scenario 2.** Sharp increase in higher education enrollment reflecting the country's development ambitions in Kenya Vision 2030. This would see a doubling of enrollment by 2030 to reach the ratio of 1,500 students per 100,000 inhabitants.
- **Scenario 3.** Moderate increase in coverage with quality improvements. This scenario retains a slower quantitative evolution compared to that of Scenario 2, with a target of 1,300 students per 100,000 inhabitants, but with a larger share of private sector enrollment and significant improvements in quality (better pedagogical supervision).

Table 3 provides a summary of the main assumptions and results of the three projection scenarios.

Table 5. Summary of the Main Assumptions and Results of the Projection Scenarios

	Baseline	Scenario 1	Scenario 2	Scenario 3
Assumption				
Students per 100,000 population	1,158	1,200	1,500	1,300
Percentage of student enrollment in public universities	85.6	85.6	85.6	75.0
Student-lecturer ratio - Public	39.5	30.0	20.0	30.0
Share of lecturers to be upgraded (%)	0.0	5.0	5.0	10.0
Percentage of enrollment in short science-based programs	25.1	25.1	25.1	50.0
Domestic revenue voted to recurrent education expenditure (%)	28.3	28.3	28.3	30.0
Choice of financing (traditional unit cost versus DUC method)	1	1	2	2
Percentage of students in private university financed by the public	0.0	0.0	10.0	10.0
Result				
Enrollment				
Public 2020	—	499,600	543,822	498,761
Public 2025	—	563,265	696,218	557,339
Public 2030	—	628,362	813,759	618,199
Lecturers				
Public 2020	—	12,638	16,151	13,601
Public 2025	—	14,249	29,123	17,468
Public 2030	—	15,896	40,688	20,607
Recurrent costs (KES, billions)				
Average 2018–2019	—	103,725	140,839	137,075
Average 2020–2025	—	120,280	170,669	153,034
Average 2026–2030	—	165,452	223,520	189,044
Likely financing (KES, billions)				
Average 2018–2019	—	105,138	105,138	106,910
Average 2020–2025	—	132,457	132,457	140,917
Average 2026–2030	—	178,662	178,662	198,639

	Baseline	Scenario 1	Scenario 2	Scenario 3
Resource gap (KES, billions)				
Average 2018–2019	—	1,413	–35,702	–30,164
Average 2020–2025	—	12,178	–38,212	–12,117
Average 2026–2030	—	13,211	–44,857	9,595

The results are different for the three scenarios in terms of development prospects for higher education (see Annexes 1, 2, and 3 for the detailed results). Scenario 1 shows a financial surplus of KES 8 billion, or about 5.4 percent of projected costs. The low enrollment growth rate and high student-to-teacher ratio limit the sector’s financial needs, which are growing at a rate of 5 percent per year while potentially maintaining the sector’s share at 23 percent of current expenditure on education and relying on average economic growth rate of 5 percent and a slight increase in the weight of domestic resources in GDP (from 18.5 percent in 2017 to 20 percent in 2020).

Scenario 2 translates into a large deficit. It reaches an annual average of KES 43 billion, or 23 percent of the sector's financing needs. This is the result of an increase in spending at a rate of 7.1 percent per year while resources continue to grow at a rate of 5.6 percent. This deficit situation proves to be fiscally unsustainable and calls for revising the assumptions of the projections to get closer to financial equilibrium.

Scenario 3, which retains a more moderate expansion assumptions than Scenario 2 and introduces elements of quality improvement, reduces the financial deficit to KES 9 billion, or 5.5 percent of financing needs. Compared to Scenario 2, the funding gap is reduced by an average of KES 34 million per year. Its complete resorption would require other measures or a more favorable economic situation, as demonstrated by the sensitivity tests that were run along with the elaboration of the scenarios.

The tentative conclusions focus on Scenario 3 orientations, which aim to expand the sector in a moderate way while providing elements of reform to make it feasible in budgetary terms and to improve the quality of higher education.

The scenarios show that Kenya’s higher education sector is at a crucial stage in its development. It has experienced exceptional growth during the decade 2008–2017, and, after a phase of reform and reflection, it is about to experience the same growth during the next decade. Reaching 950,000 students by 2030 is not an impossible dream. It is about achieving almost the same growth results as those achieved during the 2008–2017 decade when the number of students increased by 420,000. It is now a question of renewing this same performance in the context of demographic pressure accentuating the demand for access to higher education. The relevant age group will increase by more than 2 million people (from 4.59 million in 2018 to 6.66 million in 2030).

This poses significant challenges for the higher education sector, which is expected to improve its performance overall, mitigate disparities, increase the quality of teaching, and mobilize the resources needed for this expansion, all at the same time. While the financial challenge can be met by increased resource mobilization and improved operational efficiency of the system, the imperative of better quality remains fully established and requires a profound restructuring of the higher education system to avoid producing graduates with no job prospects. Thus, the moderate

evolution of student numbers as advocated by Scenario 3 remains the most appropriate. The next sections will explore how the Government of Kenya could make this scenario a reality.

2.2 Strategic Decisions Influencing Financing Needs

2.2.1. What Is at Stake

It is often assumed that the main factor influencing a country’s capacity to expand higher education with appropriate quality and relevance is the government’s willingness to invest in setting up more public universities. However, given the public resource constraints faced today by most developing countries (including Kenya), a growing number of nations have recognized that rapid growth of enrollment cannot be achieved only by following the traditional mode of building and funding new public universities with budgetary resources but also by relying on increased institutional differentiation. Thus, even though it is not a financial measure per se, spreading enrollment growth across a variety of higher education institutions and delivery modalities—public and private, on-campus and online—instead of simply expanding the public university subsector can be an effective strategy for achieving greater enrollment targets in a more financially manageable way from a public resources’ perspective. The results of the third expansion scenario analyzed in the previous section clearly indicate that Kenya must absolutely consider such an approach. Furthermore, a differentiation strategy has the advantage of supporting the training qualified manpower at all levels of qualifications, thereby responding in a comprehensive manner to the whole range of human resource needs of the country.

As mentioned earlier, the Government of Kenya proposed expansion targets that would bring the higher education enrollment rate from 11.7 percent to 15 percent by 2030. It has also announced plans for establishing the OUK, with the long-term goal of absorbing 33 percent of all programs under that modality. Using 2016 data, Table 4 shows the present configuration of the Kenyan higher education system and the planned evolution of the share of each subsector in the medium term, assuming that the private sector’s proportion of total enrollment would grow from 15 percent to 25 percent—mainly in the university subsector rather than in TVET, considering that many private institutions in the latter were not accredited—and that the OUK would already be able to take on as much as one-fifth of the total student population by 2030. The calculation of the total number of students in 2030 is based on the hypothesis that the number of secondary school graduates would increase by 3 percent every year.

Table 6. Planned Evolution of the Kenyan Higher Education System by Main Segment (2016–2030)

Subsector	2016	%	2030	%
Public universities	479,000	73.8	636,651	47.6
Private universities	85,000	13.1	234,262	17.5
OUK	0	0.0	267,728	20.0
Public TVET	27,000	4.2	100,000	7.5
Private TVET	58,000	8.9	100,000	7.5
Total	649,000	100.0	1,338,642	100.0

Source: University Education Commission and the author’s projections.

As Table 4 shows, Kenya already has a somewhat differentiated higher education system, but the public university segment still represents the lion’s share (74 percent), while the private

universities and the non-university institutions (polytechnics and TVET colleges) account for only 13 percent of total enrollment each. If the country manages to meet the planned goals for 2030 as suggested in Table 2, this would significantly alter the enrollment and cost structure, as the distance education and TVET subsectors would together account for 35 percent of total enrollment by the target date. By that time, the public universities would enroll less than half the student population, which should help the government absorb the costs of enrollment expansion in a more sustainable manner. The target structure displayed in Table 4 raises a few important policy questions that deserve careful attention:

- Will the resources needed to offer quality training in the TVET institutions, which are considered as second-rate institutions, be readily available, considering the present gaps in infrastructure and recurrent funding? Would it make sense for Kenya to transform some of the TVET colleges into community colleges following the North American or South African model, which would give opportunities for short-duration professional training and lifelong learning options for adult learners?
- Will the new OUK be able to rapidly acquire the necessary technical capacity to offer good-quality and relevant online programs that lead to qualifications that are properly recognized in the Kenyan labor market?
- What place should private higher education occupy? Is 25 percent a sufficiently ambitious target in the medium to long run, considering the fiscal constraints faced by the Kenyan higher education?

The following sections discuss the implications of these questions, considering that, in Kenya as elsewhere, balanced enrollment growth can be achieved more easily through the following three paths: (a) development of good quality non-university higher institutions, (b) expansion of distance education, and (c) development of a dynamic, good-quality private higher education subsector (Salmi 2017).

2.2.2. Development of the Non-university Subsector

The financial imperative to contain the growth of public universities makes it all the more important to increase non-university training opportunities, given the need for marketable skills among a growing number of students who do not necessarily have the academic capacity to thrive at university. In recent years, the proportion of candidates taking the KCSE and obtaining a C+ or above decreased from 32 percent in 2015 to 11 percent in 2017, as a result of stringent measures to eliminate cheating and select better qualified high school graduates. In addition to protecting the resource base of the public universities by absorbing a significant proportion of secondary school graduates, the non-university higher education institutions can make a major developmental contribution by offering training opportunities that respond flexibly to labor market demand.

Post-secondary community colleges occupy a useful place within differentiated higher education systems, as the Canadian, Korean, and U.S. experiences reveal. In Canada, community colleges enrolled 42.8 percent of the total undergraduate population in 2017, playing a key role in the preparation of middle-level workers and employees. In Korea, the number of junior colleges is almost as high as the number of universities (152 and 178, respectively). In the United States, the proportion of students enrolled in that subsector was 43 percent in 2017 (Box 1).

Box 1. Importance of Community Colleges in Preparing for Middle-skills Jobs

According to labor economist Carnevale, Executive Director of Georgetown University's Center on Education and the Workforce, almost a third—17 million out of 55 million—new job openings between 2010 and 2020 would require middle skills, as baby boomers retire, and new jobs are created.

Today, the United States largely relies on community colleges to provide entry-level training for the sub-baccalaureate workforce, not only in factories and foundries but in healthcare institutions and white-collar offices. Middle-skill jobs now require more formal workforce preparation to make entry-level workers 'training ready' as they begin their careers.

Community colleges are ideally situated to provide practical career and technical preparation as well as general learning. The mix of general academic learning and workforce preparation that is the unique signature of the nation's community colleges can lead to both further education and learning on the job. Moreover, the community colleges' mix of general competencies and workforce development allows students to become more active citizens and successful workers.

Community colleges have for decades been doing what middle-skill workers need now: retraining the long-term unemployed, matching new graduates' skill sets to job opportunities through internships and mentoring, serving regional geographic localities, and training-up nontraditional students. These things form the backbone of the community college mandate.

Source: Carnevale and Smith 2013.

Along the same lines as community colleges, vocationally oriented higher education-level institutions are also able to offer flexible training opportunities to young people who are not prepared or motivated to undertake a long academic career. In Brazil, for example, the technical training centers operated by National Industrial Training Services (SENAI) successfully operate multidisciplinary programs in a large number of professional fields. Its Colombian equivalent, SENA, enrolls close to 40 percent of all post-secondary students. The success of such institutions hinges on their ability to forge and maintain close links with employers to guarantee the relevance of the training provided. This is best achieved by securing internships for all the students and welcoming representatives from the productive sectors into the governance bodies of the institutions and involving them systematically in curriculum design and updating.

Table 5, which shows the relative share of GDP spent by select OECD countries in support of universities and non-university institutions in OECD countries, illustrates the reduced fiscal burden that non-university institutions represent for the public purse. The ratio of university to non-university costs ranges between 1.9 and 8.0. This is excluding research expenditures, which would significantly increase the level of university expenditures, if included.

Table 7. Total Expenditures Per Type of Institution as a Share of GDP (2014)

Country	Non-university Institutions (A)	Universities (B)	Ratio (B/A)
Australia	0.3	1.6	5.3
Austria	0.3	1.5	5.0
Canada	0.9	1.7	1.9
Chile	0.3	1.7	5.7
France	0.3	1.2	4.0
Israel	0.2	1.3	6.5
Japan	0.2	1.3	6.5
Korea	0.3	2.0	6.7
New Zealand	0.2	1.6	8.0
Spain	0.2	1.1	5.5
OECD	0.2	1.4	7.0

Source: OECD Education at a Glance 2017.

According to the assessment made in the latest National Education Plan prepared by the Kenyan government, the TVET institutions face many challenges. Most of them do not have adequate infrastructure and equipment to support the teaching of the national competency-based curriculum. Many instructors have not received appropriate training to teach technical skills. The program of these institutions is not fully aligned with the competency-based curriculum, and the links with industry are quite weak. In addition, these institutions are dispersed across several ministries, resulting in limited homogeneity in programs and standards. For these reasons, parents and students perceive TVET programs as second-rate options for students with lesser academic abilities and aspirations.

Strengthening this important segment of the higher education system will therefore require significant efforts to train instructors more thoroughly, establish close links to industry, modernize the training infrastructure, and deploy existing resources in the most efficient way.

At present, the private segment of the TVET subsector is twice as large as the public one in terms of enrollment. Until a few years ago, the quality and relevance of many private institutions was unlikely to be more satisfactory than what is offered in the public segment, as many private institutions operated without proper registration or accreditation. Now that they must all get duly registered and accredited the quality and relevance of their programs should be of higher standards.

Looking forward, the Kenyan government may consider promoting the establishment of post-secondary community colleges based on the North American or Korean model as a useful component of the non-university subsector that could be better perceived by Kenyan parents and students than the existing TVET colleges. Recent developments in the United States have revealed that many community colleges tend to offer vocationally oriented programs that give the middle- and high-level skills required for entry into many professions. In fact, specialists nowadays tend to look at TVET institutions and community colleges as performing similar functions and label them as providers of technical and career education. The Georgetown University's Center on Education and the Workforce estimates that, between now and 2024, "the United States will be home to some 16 million openings for middle-skill jobs—those requiring more education than a high school diploma but typically not a bachelor's degree. These jobs are in industries such as

computer technology, health care, construction and high-skill manufacturing, and require yearlong certificates or two-year degrees. ... Another key entry point for getting a good job: short-term training programs, increasingly offered by community colleges as non-credit boot camps” (Selingo 2018).

2.2.3. Expanding Cost-effective Distance Education Modes

Even though Kenya has played host to the African Virtual University for two decades, distance education has remained marginal to this date. The government’s decision to set up an open university could signify a major departure from past practices and signal the availability of new learning opportunities for hundreds of thousands of Kenyan youths and adults.

To make sure that the OUK operates as a leading-edge online institution, its leadership team could learn from the experience and business model of other well-functioning online institutions, such as Western Governors University (WGU) in the United States, which has become one of the most successful online universities in the world. WGU is a private nonprofit, fully online university, whose curriculum is competency based. Established in 1997 at the initiative of the governors of several states in the Western part of the United States, its mission is to improve the quality of the workforce and expand access by providing its mostly adult learners with opportunities for independent studies, regardless of time or place. The university offers bachelor’s and master’s degrees in teaching, nursing, IT, and business administration and has been recording impressive successes as measured by graduation rates, employer satisfaction, student engagement, and follow-up with alumni (Middlehurst and Fielden 2016).

WGU does not employ traditional instructors and its academic courses do not follow conventional standards. Students advance through their coursework independently and at their own pace. Faculty members, who are external providers contracted by the university, give personalized support to students. WGU breaks the traditional model of integrated course design, delivery, and assessment where a faculty member is fully responsible for developing, teaching, and assessing her/his own course. Instead, WGU unbundles the process by assigning each of these responsibilities to different groups of professionals, including industry experts. The success of this innovative online model has been due in large part to the extensive academic support that learners receive from WGU: every student is paired with a mentor who provides advice, from enrollment to graduation. In addition, each course has a group of mentors responsible for disciplinary support (this is the equivalent of a teaching assistant in the traditional campus-based model). Learners also receive help from WGU’s Career and Professional Development Center that provides guidance to job seekers or to employed students seeking new opportunities.

Another useful example is that of GetSmarter, a South African online provider, that acts as an intermediary between students and top universities in South Africa and elsewhere. It offers certified online short courses designed for working professionals. With a staff of 500 people (mostly English-speaking tutors), it has reached about 80,000 students in close to 140 countries in the past few years.⁵ The average duration of GetSmarter courses is between 10 and 12 weeks. The tutor-led, student-based continuing education program is sanctioned by a certification of competence or attendance by one of the member universities, all of them leading institutions from

⁵ <https://www.getsmarter.com/>.

South Africa, the United Kingdom, and the United States. The average completion rate is 92 percent, an impressive result for an online program. The success of the program is mainly because it is not a mass course such as most massive open online course (MOOCs) but a personalized program with relatively small groups. This allows the tutors to give close feedback to the students. As a digital provider, GetSmarter is able to use a strong data-driven approach that focuses on students' learning gains to measure progress and give personalized support to students who are challenged by the course. While 40 percent of GetSmarter's students hail from South Africa, the others are distributed among North America; the United Kingdom; Hong Kong SAR, China; Singapore; and the Middle East.

Generally speaking, the proposed OUK could take advantage of the availability of high-end MOOCs to develop its program and course offerings. Today, the MOOCs come complete with exams and electronic feedback from teaching assistants with some also providing certificates to students who complete the courses.

The new OUK has the potential of absorbing a large proportion of Kenyan students, following the example of other countries, such as Thailand, that have included distance education as an important pillar of their expansion strategy. Although statistics are not available, it appears that thousands of Kenyan students are enrolled in foreign distance education institutions, including British and South African institutions. Thailand's two open universities enroll almost half of the total student population, thus being the principal instrument for expanding access and reaching out to students from rural areas and the poorest social stratum (Salmi 2017). As a result, Thailand had a tertiary enrollment rate of 52 percent in 2014, which is much higher than the rate achieved by its neighbor, Malaysia (30 percent), even though the latter is one of the countries in the world that devotes the highest share of public resources to tertiary education (2.6 percent). Furthermore, Thailand's higher education system is much more equal than that of its East Asian neighbors. The percentage of people ages 25–29 from the poorest income quintile who have completed at least two years of tertiary education reached 26.7 percent in 2014, compared to only 2 percent, 3 percent, and 4 percent in Indonesia, Vietnam, and the Philippines, respectively.

One of the main challenges faced by online courses and material is to avoid a one-size-fits-all approach (Nazeeri 2018). Experience shows that the most effective online courses are not mere online versions of the regular campus offering of the same courses. They must reflect the unique curricular approach of each institution, faculty, or program and embody appropriate pedagogical features to facilitate self-learning. To overcome this potential problem, a growing number of colleges and universities enlist the help of in-house instructional designers or outside software firms that offer online platform services (Wearden 2018).

The other major challenge faced by online education is the fact that those who could potentially benefit most from e-learning opportunities—students from disadvantaged background—are also those at highest risk of not doing well and dropping out (Dynarski 2018). Self-learning requires high levels of motivation, discipline, and organization. Online education, therefore, gives great opportunities to students with strong academic capacity. Recent research on the results of first-generation students enrolled in U.S. online nonselective colleges and for-profit universities shows that they fare significantly worse than students enrolled in regular on-campus programs (Bettinger et al. 2017). For these students, blended learning or on-campus learning seems to be more effective than online only.

2.2.4. Development of the Private Sector

Faced with a rapidly growing demand for higher education, many nations have encouraged the growth of private universities and institutes to complement public investment, as part of their expansion and institutional differentiation strategy. In several cases, the growth of private tertiary education has been so significant that more students are enrolled in private institutions than public ones, as can be seen in several Latin American countries and East Asian economies. In Sub-Saharan Africa, Côte d’Ivoire has the highest proportion (80 percent). Table 6 presents the average proportion of private sector enrollment in various regions of the planet, illustrating how it has become a worldwide phenomenon.

Table 8. Private Enrollment as a Share of Total Tertiary Education Enrollment by Region

Region	Proportion
East Asia and the Pacific	42.2
Eastern Europe and Central Asia	29.2
Latin America and the Caribbean	50.2
Middle East and North Africa	39.0
South Asia	47.0
Sub-Saharan Africa	32.0

Source: Salmi 2017.

Private higher education institutions come in various forms. Using the two dimensions of degree of selectivity in admissions and legal status, one can distinguish among at least eight categories of such institutions (Table 7). Several Asian, Latin American, and Middle Eastern countries have highly selective private universities—secular and/or religious—that are often among the best in these countries. The second tier is made up of less academically and socially selective institutions. The third tier consists of open access private institutions that are often of dubious quality (Salmi 2017).

Table 9. Types of Private Tertiary Education Institutions

Degree of Selectivity/Legal Status	Elite	Semi-elite	Non-elite
Secular nonprofit	X	X	X
Religious nonprofit	X	X	
For-profit		X	X
Public-private partnerships	X		

Source: Salmi 2017.

Poland is an interesting example of rapid growth of nonprofit private higher education in Europe. Between 1989 and 2005, the country’s tertiary education system underwent a transition from elite to mass in about half the time that other countries took for the same achievement (Duczmal 2006). The newly emerging private sector was at the forefront of that process. By 2010, 32 percent of all enrollments in higher education were in the private sector, representing 71 percent of the total number of higher education institutions. Today, the Polish private higher education sector is the largest one in Europe, followed by Romania where both nonprofit and for-profit private institutions operate.

This rapid expansion was fueled by three factors. The first one was the rapidly growing demand for higher education, which could not be accommodated by the public sector for lack of budgetary resources. The second one is that the Polish government allowed public university professors to take teaching assignments in private institutions. Without the contribution of these professors as part-time instructors, the private sector could not have enjoyed the same kind of expansion. Finally, the government put in place non-taxing licensing criteria to authorize new private tertiary education institutions to operate. To start a bachelor's program, private institutions needed only a few high-level professors, an approved curriculum, and a minimal teaching infrastructure.

Africa was the last region to witness private sector development in higher education, starting in the late 1980s. But the increase has been spectacular in the past two decades. Between 1990 and 2014, the number of private institutions rose from 30 to about 1,000, compared to a growth of 100 to 500 for public universities (Bloom et al. 2014).

There are few examples in the world of private institutions resulting from a partnership with the state, but where they exist they represent an innovative funding approach. Some of the best-known cases can be found in Malaysia, where three public corporations sponsored the establishment of a private university each (Universiti Teknologi Petronas [UTP], Kuala Lumpur Infrastructure University College [KLIUC], and Multimedia University [MMU]). In each case, the public corporation financed all the initial investment costs and the first three years of operating expenditures. Afterward, the new universities had to function as independent private entities, without further public support except for student aid. Similarly, Al Akhawayne University in Morocco was initially funded by an investment grant from the Kings of Morocco and Saudi Arabia but operates today as a private, American-style university accredited by the New England Association of Schools and Colleges.⁶

Against this background, the Kenyan government's decision to promote the expansion of private higher education as an integral part of its higher education development strategy is a positive development. In particular, the fact that some students enrolled in private institutions are now eligible for Kenyan Higher Education Loans Board (HELB) loans goes a long way toward reducing the financial barrier faced by low-income students. As part of that strategy, the new practice of the Admission and Placement Board to orient some students toward private universities signals strong support for that subsector.

To further facilitate the development of a good-quality private sector, the Kenyan government can envisage two sets of measures. First, in terms of regulatory framework, it is important to remove any legal or administrative hurdle that may unduly constrain the establishment and operation of private higher education institutions, without compromising on the QA requirements. For that purpose, the Commission of University Education could conduct a review of the existing regulatory framework to identify any counter-productive legal, financial, or administrative obligation imposed on private institutions. To help with that review, Box 2 presents good practices for licensing and accrediting private higher education institutions.

⁶ <http://www.aui.ma/en/>.

Box 2. Removing Regulatory Barriers for Private Higher Education Institutions

To assess whether a country has favorable legislation and regulation for the private tertiary education sector, it is useful to consider the following five aspects:

- Barriers to entry: Are there any precluding the entry of private providers, including foreign ones?
- Institutional autonomy: Does the regulatory body allow full institutional autonomy (organizational, academic, financial, and HR) for private tertiary education institutions?
- Eligibility for government subsidies: Can private institutions benefit from the incentives or subsidies available to public institutions, such as tax exemptions, land leases, and salaries of academics?
- Eligibility of private institution students for state scholarships grants or loans: Can students from private institutions benefit from government subsidies that are available to students who share the same socioeconomic characteristics, but who are enrolled in public institutions?
- Transparent QA: Does the country have clear evaluation and accreditation criteria and procedures that apply equally to all tertiary education institutions?

Good practice for licensing tertiary education institutions include the following considerations:

- Clear criteria and timelines, and regulatory bodies that fully comply with their own criteria and deadlines.
- Small number of requirements in the licensing phase as opposed to the accreditation stage, which should legitimately combine a strong self-evaluation report and a thorough external evaluation by independent peers.

Source: Elaborated by Jamil Salmi.

At the same time, the Kenyan government must ensure that the existing QA mechanisms and processes (licensing and accreditation) are rigorous enough to guarantee high standards in the program offerings of private institutions, without being too cumbersome or lengthy.

Second, in the medium term, Kenya could consider the possibility of offering limited subsidies to the private institutions that are fully accredited, especially those offering STEM degrees that are in high demand in the labor market. As mentioned earlier, the decision to make students enrolled in private universities eligible for HELB loans is a good measure to ensure equal opportunities among Kenyan students. Private institutions might also be given the opportunity to apply for government budgetary support in areas of high priority, such as the STEM disciplines, should private sector investors be willing to set up the good quality-scientific facilities needed for this kind of program. Subsidies for teacher salaries could also be considered, as is the practice in Malawi for instance. Another support mechanism could be to grant or lease public land to private higher education institutions.

Of course, legal facilities and financial incentives to stimulate the development of quality private higher education institutions can be justified only on the grounds that they provide a means of expanding enrollments at lower public cost than by expanding public universities using scarce budgetary resources, especially in the STEM disciplines.

An important consideration that affects the quality of private tertiary education is the need for a clear legal framework to distinguish between for-profit and nonprofit institutions. In many countries—notably in Latin America, Asia, and Africa—the absence of such legislation results in the operation of commercial enterprises barely disguised as nonprofit universities. This situation has serious implications. First, the owners of private institutions may be more inclined to maximize their profit share than reinvesting any surplus in the education side of the institution. Second, realizing profits under the guise of a nonprofit status may be seen as a form of tax evasion,

representing a social loss to the country. Third, some countries—for example, Colombia—are concerned about money laundering through private higher education institutions.

Legislation allowing private universities to be for-profit, if properly designed, could bring these questionable practices into the open and allow the profits to be properly taxed. Even when private universities do not get direct subsidies, they may benefit from public contributions indirectly, through student aid and research funding. Therefore, all their financial transactions need to be transparent to demonstrate that resources, both public and private, are being properly used. To facilitate a more objective discussion of the pros and cons of allowing for-profit institutions to operate, Figure 2 outlines the main differences between nonprofit and for-profit institutions that the regulatory framework needs to take into account.

Figure 2. Key Areas of Differentiation between Nonprofit and For-profit Private Higher Education Institutions

Nonprofit corporation	Criteria	For-profit entity
Driving Motive		
Welfare/public good		Profit
Ownership		
Stakeholders	Individual(s), corporation, trust, foundation, other ways of constituting an institution	Shareholders
Profit Distribution		
Non-distributed (fully reinvested in infrastructure, educational inputs)		Distributed to shareholders
Tax Liability		
Exempted (revenue, property, duties)	Tax holiday	Fully taxed at corporate rates
Public Subsidy		
100% eligible		0% eligible

Source: Elaborated by Jamil Salmi, Richard Hopper, and Svava Bjarnson.

2.2.5. Achieving Synergies and Complementarities

For this institutional diversification strategy to work in the long term, it is important to define clear policies regarding the respective roles of the various types of institutions. One of the challenges that many countries in the developing world face is to dispel the perception that non-university institutions and programs are second-rate options compared to the traditional universities. In that

regard, it would be useful to think through the functional links among the various types of higher education institutions. Universities and non-university institutions should not operate as parallel, unrelated subsectors but rather as complementary parts of a well-articulated system that offers multiple learning paths.

To achieve this complementarity, student progression could be encouraged by removing all the barriers among the segments of the higher education system, among institutions within each segment, and among disciplines and programs within institutions. The promotion of open systems can be achieved through recognition of relevant prior professional and academic experience, degree equivalencies, credit transfer, tuition exchange schemes, easy access to national scholarships and student loans, and creation of a comprehensive qualifications framework. Full implementation of the regulations set out by the Kenya National Qualifications Agency (KNQA) would help eliminate existing rigidities that hinder accumulation, recognition, and transfer of individual qualifications from one institution to another and from one subsector to another.

Recognition of prior learning (RPL) is a positive practice in a number of OECD countries, particularly in the northern and western parts of Europe, albeit one that affects small numbers of learners (Box 3). The practice varies between those countries allowing entry through RPL to all higher education institutions or programs and those allowing entry to some. Some countries leave it up to the higher education institutions to organize their own processes while others provide a national framework for this. In Europe, the Trends 2015 survey results show that RPL is part of an alternative entry route provided by 46 percent of institutions and a way of gaining credits that count toward a study program for 61 percent. Only 14 percent of institutions do not have a process in place to recognize prior learning while, at the other end of the spectrum, 19 percent are able to award a full degree on the basis of RPL (Sursock 2015).

Box 3. Recognition and Validation of Prior Learning in Europe

In the Flemish Community of Belgium, regulations allow higher education institutions to grant access to bachelor's programs on the basis of a candidate's overall knowledge and skills that are assessed by the board of the institution. Prior nonformal and informal learning can also be recognized for access to doctoral programs for those who do not hold a master's degree.

In Germany, in 2009, the Länder (states) established a standard procedure under which master craftsmen, technicians, and those with vocational qualifications in a commercial or financial area are eligible to enter higher education if they have at least three years' experience in their professional field.

In France, the validation of experience-based learning (*Validation des Acquis de l'Expérience*) allows individuals to get full or partial recognition of the skills and professional qualifications acquired on the job. Any individual, regardless of age, nationality, or legal status, can participate in this process after three years of salaried, nonsalaried, or voluntary professional activity or experience. The outcome is a diploma (including at the doctoral level) or professional certificate inscribed into the National Registry of Vocational Qualifications.

In Portugal, students over 23 years of age with no formal qualifications, together with students who have the appropriate postsecondary qualifications, may gain admission to higher education through specific examinations that prove their ability to undertake the course in question. Individual higher education institutions set these examinations.

In Spain, each year, universities reserve a certain number of places to be allocated to higher education candidates who fit into specific categories. These categories include three groups of mature students: students older than 25, 40, and 45 years. Candidates over the age of 25 who comply with traditional entry requirements may be admitted to higher education programs on successful completion of a special university entrance examination. This examination consists of a general part (including three tests) and a specific part to assess the skills, abilities, and aptitude for the studies chosen. Candidates over the age of 40 who do not possess a qualification that permits access to higher education can have their prior professional experience accredited if it is linked to the courses they want to take. Universities define the accreditation criteria and the professional experience required for different study programs. The admissions procedure always includes a personal interview. Those of age 45 and over who do not possess a qualification which permits access to higher education, and who do not have a relevant professional experience, may be admitted to higher education on successful completion of a general test and personal interview.

In Sweden, since 2003, all higher education institutions have been mandated to assess, on request, the prior and experiential learning of applicants who lack formal qualifications. In 2006, around 5,800 applicants asked to have their nonformal and informal learning accredited and almost 2,000 applicants were considered to meet the admission requirements for the program or course they applied for. Due to competition with other students, only around 1,000 nontraditional applicants were subsequently admitted to higher education.

Source: Eurydice Networks. *Adults in Formal Education: Policies and Practices in Europe*. Brussels: Education, Audiovisual and Culture Executive Agency. French Ministry of Education website. http://www.vae.gouv.fr/_pdf/accueil_version_anglaise.pdf.

A very innovative example of a flexible platform for recognizing qualifications acquired in a variety of settings can be found in Korea. The Academic Credit Bank System (ACBS) gives the opportunity to students taking classes from different institutions to acquire an actual degree issued and validated by the Ministry of Education (Box 4).

Box 4. The Korean Academic Credit Bank

Established in 1998, Korea's ACBS allows students to earn a degree by combining academic credits acquired from a variety of sources. Although the ACBS was originally formed to give students a path toward a degree without requiring postsecondary institutes to recognize transfer credits, it is also useful for students who have nearly enough qualifications to graduate but are deterred from finishing by the difficulty of registering in a new institution with the risk of needing to repeat classes. A particularly pressing problem came from students who had obtained academic credits from more than one institution but did not possess enough credits from any single institution to obtain a degree. The government's solution to the problem of universities and colleges refusing to deliver greater system flexibility through transfer credits was to create a new system that circumvents the universities on credit transfer.

What the ACBS allows people to do is to pool the credits they have earned from various sources and package those into a degree, or a plan of study that leads to a degree. The ACBS is not a Prior Learning Assessment and Recognition system. When the ACBS certifies that someone has a degree and asks the Ministry of Education to issue the degree, it is not certifying that the degree recipient possesses the knowledge and skills equivalent to someone who holds that same degree from an institution. Rather, it is actually certifying that students have followed an ABCS-designed curriculum and accumulated the relevant number of core, general, and elective credits for that program. To do this, the ACBS has, with the assistance of numerous subject matter experts, developed its own standard curriculum for each of its 218-degree programs (109 majors and 24 degrees at the bachelor's level and 109 majors and 13 degrees at the associate's level).

Students wishing to obtain a degree from the ACBS begin by registering in a particular program. The registration may occur at any point in the credit accumulation period. The ACBS verifies that the courses match program requirements and that they have been issued by accredited programs. If the accumulated credits meet the specifications of the curriculum, then the ACBS recommends that the ministry issue a degree to the student.

The ACBS has grown rapidly over the years. In 2006, 12,376 students registered to pursue an associate degree, and 39,146 to seek a bachelor's degree. By 2011, the number of registered students had reached 62,087 at the associate degree level and 59,336 at the bachelor level. The ACBS awarded 5,084 associate degrees and 14,009 bachelor's degrees in 2006. In 2011, the numbers were 29,585 and 22,769, respectively.

The main challenge confronting the ACBS is the issue of quality control. An increasing percentage of credits are coming from online providers whose quality is difficult to monitor. The ACBS takes extra measures to counter potential fraud, most notably by requiring private online providers to get accredited every two years instead of the usual four. The ACBS officials are aware that the possibility of fraud will remain a reputational threat into the indefinite future. The worry is that if abuses are uncovered at a few ACBS-accredited institutions, it will taint all the ACBS degrees, past and present.

Source: Usher 2014.

Another articulation mechanism worth considering is a common course numbering system for the whole of Kenya. Such a system exists in the U.S. state of Florida and it is one of the key tools used there to facilitate efficient and effective progression among the 11 state universities and 28 community colleges, in the context of a statewide articulation agreement. This has helped create a seamless and cost-effective pathway between the community colleges and the universities. As a result, half of the students receiving a bachelor's degree in the state of Florida originate in the community college subsystem. Box 5 provides a short description of this system. In total, 17 states have their own system of common course numbering to facilitate transfers across institutions.

Box 5. The Florida Common Course Numbering System

Created in the 1960s, Florida's Statewide Course Numbering System is a key component of the state's K-20 seamless system of articulation. The system provides a database of postsecondary courses at public vocational-technical centers, community colleges, universities, and participating nonpublic institutions. The assigned numbers describe course content to improve research, assist program planning, and make the transfer of students easy.

The system is coordinated by the Office of Articulation, which is responsible for facilitating the effective and efficient progression and transfer of students through Florida's K-20 education system. The Office manages acceleration programs that can take the form of dual enrollment in high school and postsecondary courses, recognition by examination of credit acquired elsewhere, and transfer from colleges to universities.

Source: http://scns.fldoe.org/scns/public/pb_index.jsp.

2.3 Resource Mobilization

2.3.1 Scope for Additional Fiscal Resources

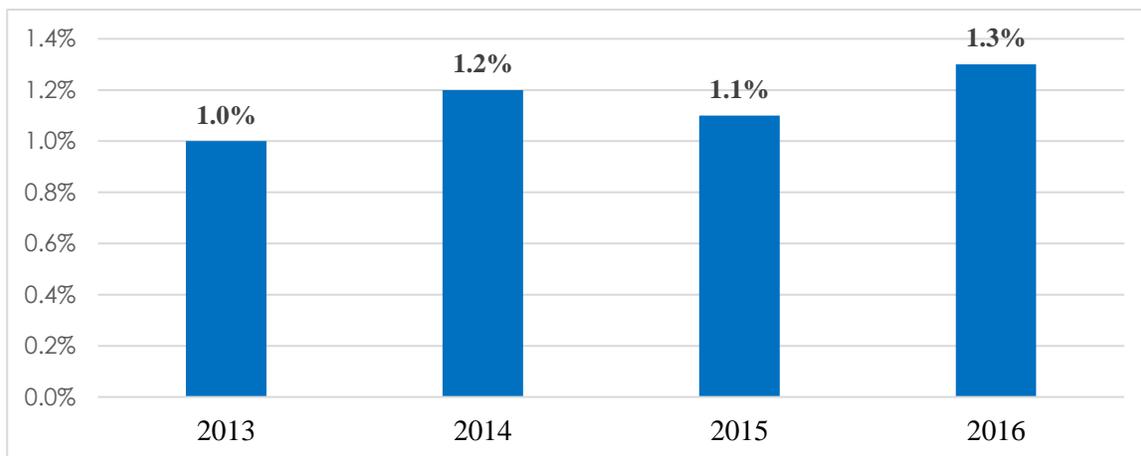
When it comes to the main characteristics of their resource mobilization strategies, higher education systems all over the world can be divided approximately into four main groups:

- (a) A small number (about a dozen countries) of very well-funded systems that rely almost exclusively on public funding (more than 1.5 percent of GDP) and public provision (more than 90 percent of enrollment). These include the Gulf countries, the Nordic countries, Saudi Arabia, Scotland,⁷ and Singapore.
- (b) A small number (less than 10 countries) of predominantly public systems that are well funded through a combination of public resources and a significant level of cost sharing mitigated by appropriate student aid. The countries found in this category are Australia; Canada; England; Hong Kong SAR, China; Iceland; the Netherlands; New Zealand; and Switzerland.
- (c) Mixed provision systems (more than 25 percent private enrollment), relatively well funded through public resources and with relatively high levels of cost sharing for all students in both public and private institutions. These include China, Japan, Jordan, Malaysia, Korea, and the United States.
- (d) Public and mixed provision systems that tend to be insufficiently funded overall (most other countries). Governments in some of these countries allow public universities to charge fees in selective programs that cater directly to labor market needs. This is the case in African countries such as Egypt, Ghana, Kenya, Tanzania, and Uganda and many former socialist nations of Eastern Europe and Central Asia (including countries from the former Soviet Union and former Yugoslavia).

⁷ While it is true that Scotland does not charge fees for Scottish students, 45 percent of the Scottish universities teaching income is financed by the tuition fees paid by foreign students and non-Scottish U.K. students, up from 39 percent in 2010. To a certain extent, the fee-paying students are cross-subsidizing the Scottish students.

Kenya belongs to the fourth group of countries. Figure 3, which shows the evolution of public spending on higher education (universities and technical colleges) over the past few years, reveals that it is in the same range as the OECD average of 1.0 percent of GDP, with a slight increase to 1.3 percent in 2016.

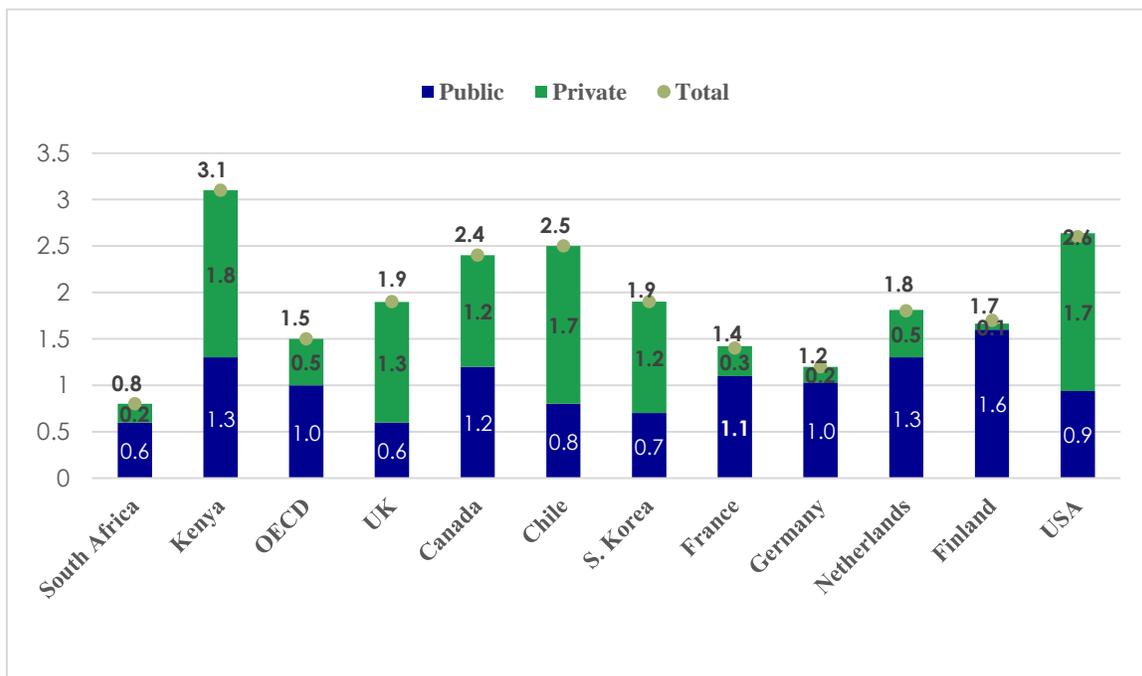
Figure 3. Public Spending on Higher Education as a Proportion of GDP in Kenya



Source: 2018 Public Expenditure Review.

Figure 4 compares the level of public and private spending on higher education in Kenya with select OECD nations. Seen from an international perspective, Kenya has the highest proportion of public funding after Finland and one of the largest proportions of private funding going to higher education.

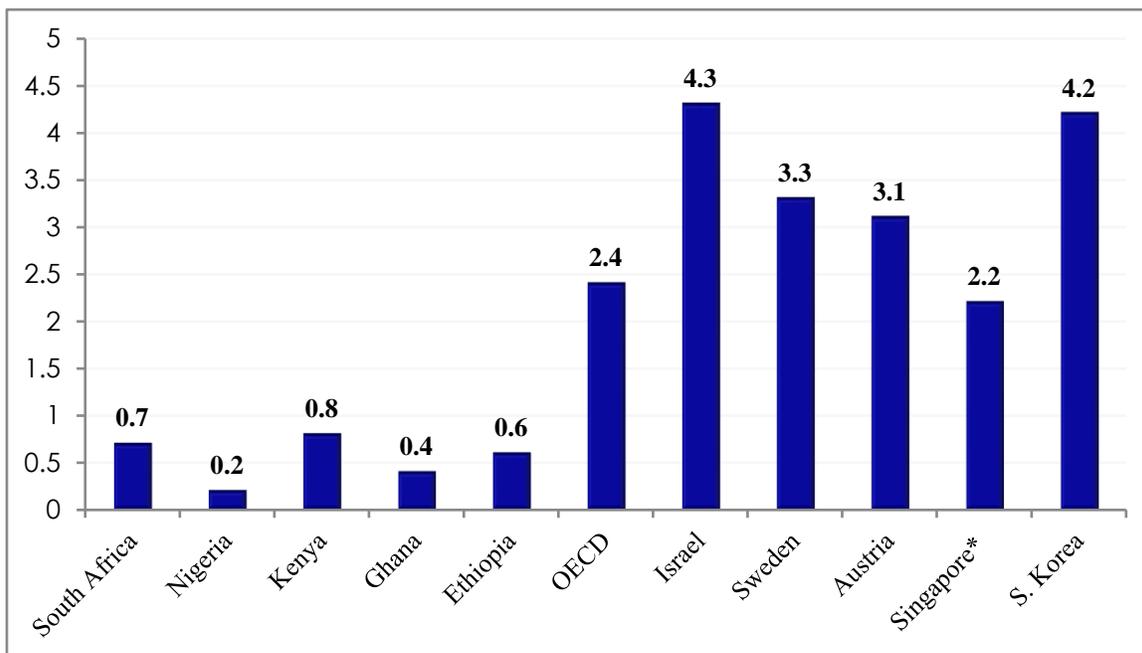
Figure 4. Total Spending on Tertiary Education in 2015 as a Percentage of GDP in Kenya and Comparator Countries



Source: OECD Education at a Glance 2018 and Public Expenditures Review 2018.

Kenya spends about 0.8 percent of its GDP on research. To put the Kenyan situation in an international perspective, Figure 5 compares its level of research funding with select African and top OECD countries. While Kenya has the highest expenditure level among the African comparators, its spending is three times smaller than the OECD average.

Figure 5. Gross Expenditure on Research and Development as Percentage of GDP in Kenya and Comparator Countries (2018)



Source: Global Innovation Index 2018.

Assuming that the financing data measuring the share of GDP going to higher education in Kenya are reliable, it is doubtful that the government could significantly increase the current level of public expenditures to support the planned enrollment expansion up to 15 percent of the age group by 2030 and at the same time finance the quality improvements required in the university and TVET subsectors. The government is also planning to raise the proportion of students enrolled in STEM programs to 60 percent, which will inevitably result in higher levels of expenditures because of the scientific infrastructure needed in these fields. For these reasons, implementing the kind of institutional diversification strategy advocated in the previous section should be a high priority.

The data also show that Kenya's investment in research is still on the low side if the country wants to boost the scientific contribution of its research universities to innovation and productivity throughout the economy. The country would need to more than double its research investment to meet the 2 percent commitment made in Vision 2030.

In addition, it would be important to make full use of available budgetary resources allocated to research. In recent years, the level of annual execution of the research budget has been decreasing, from 98 percent in 2013 to 78 percent in 2015 and only 22 percent in 2016.

Another way to maximize the use of budgetary resources is to improve the internal efficiency of the various types of publicly funded programs. While data are not available for the public universities and TVET colleges, statistics about the graduation rates at teacher training colleges reveal that the situation has deteriorated in recent years, as Table 8 shows. It is likely that substantial savings could be achieved throughout the public institutions by putting in place effective retention programs to reduce the current level of dropouts and increase completion rates. It would therefore be important for the Commission for University Education (CUE) to enforce reliable monitoring systems, within each public higher education institution, to assess possible wastage and opportunities for more efficient use of public resources linked to the phenomena of repetition and dropouts. CUE should view the establishment of a comprehensive Higher Education Management Information System as a priority to ensure that the government can make informed policy decisions to improve the performance of the higher education system.

Table 10. Dropout Rates at the Teacher Training Colleges (2014–2016)

Academic Year	Completion Rate (%)
2014/15	90%
2015/16	82%
2016/17	68%

Source: Ministry of Education, Kenya 2019.

Finally, resource sharing is a useful manner of mobilizing additional resources indirectly. A growing number of universities across the world have redesigned and reorganized their scientific laboratories so that several departments across the institution can use shared facilities, which allows a higher utilization rate of expensive scientific equipment. Online laboratories and ‘Lab at Distance’ systems allow users to access expensive laboratory equipment at a distance and perform experiments remotely. In Quebec, for example, the network of community colleges (CEGEP) has experimented with conducting scientific experiments in one college while students in other colleges are connected by video and Internet to work remotely in the same lab facilities and participate in experiments without being physically present.⁸ This digital sharing of scientific facilities and resources can be extended to many fields and can even be organized across national boundaries with researchers in one country program running experiments that actually take place in the laboratory of a university in another country.

2.3.2 Potential for Income Diversification

Table 9 shows how the structure of funding in the Kenyan public universities compares with the European Union (EU) and OECD averages. Even though the Kenyan universities are public institutions, they receive less than 60 percent of their total income from the government, which is significantly below the OECD and EU averages.

⁸ Field visits by Jamil Salmi.

Table 11. Funding Structure in 2017 (%)

Funding Distribution	Kenya	OECD Average	EU Average
Public budget	59	68	79
Tuition fees and third stream	41	32	21

Source: 2018 Public Expenditures Review and OECD 2018 Education at a Glance.

To promote further income diversification, the Government of Kenya has two avenues: (a) allow the public universities to raise fees and (b) encourage them to diversify their sources of income. The next sections explore each of these two aspects.

Cost Sharing and Financial Aid

Countries across the world can be divided into three main groups when it comes to cost sharing in public universities. The first group, already mentioned earlier, consists of the rich countries that do not charge fees. The second group is made up of countries that charge fees to all students, with various forms and levels of financial aid to protect low-income students from financial barriers. The last group, to which Kenya belongs, consists of nations that charge substantial fees to only select groups of students. Chile, Italy, South Africa, the Canadian Province of Ontario, and the U.S. state of New York lead the group of countries or regions that have recently introduced Targeted Free Tuition (TFT), a relatively new funding model whereby only the poorest students are exempted from paying fees, following the example of some equity-conscious private universities in North and South America. Other countries, notably most former socialist nations in Eastern Europe and Central Asia and a few Sub-Saharan African countries including Kenya, allow the most academically qualified students to study free of charge or with low fees but require the other students who wish to enroll to pay high fees. Table 10 summarizes the equity and financial sustainability impact of each of these approaches.

Table 12. Sustainability and Equity Impact of Various Cost-sharing Schemes

Cost-sharing Modality	Financial Sustainability Impact	Equity Impact
Free higher education for all	Very costly	Richer students more likely to benefit
Universal fees	Less demanding on fiscal resources	Equitable if financial aid available
Fees only for parallel students	Less demanding on fiscal resources	Richer students more likely to benefit
TFT	Costly	Potentially most equitable

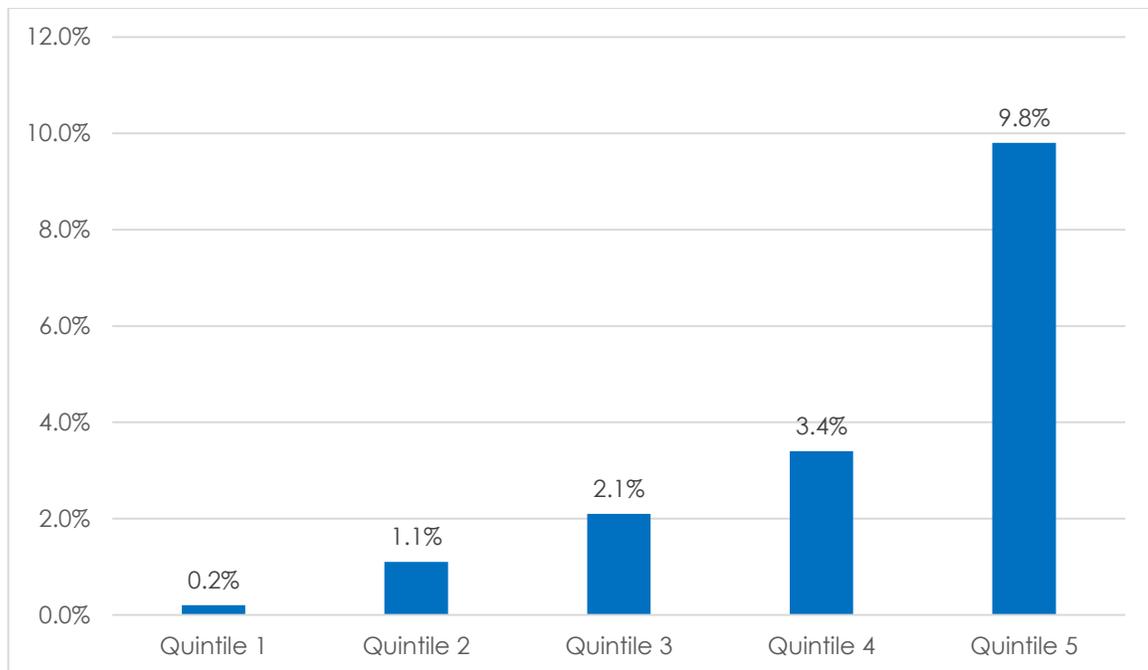
Source: Elaborated by Jamil Salmi.

In 1995, the government established HELB as a state corporation mandated to manage financial assistance for students enrolled in Kenyan public and private universities and TVET institutes. The main activity of HELB is to support undergraduate students with loans ranging from a minimum of KES 35,000 to a maximum of KES 60,000, according to individual needs and the Board's resources. The loans are subject to an interest rate of 4 percent per year, and students are expected to start repayment of their loans within one year of the completion of studies.

Figure 6, which presents the socioeconomic distribution of students, confirms the extremely unequal social configuration of the Kenyan higher education system in spite of the availability of financial aid. The disparity ratio is 49, meaning that a young Kenyan from the richest income group is 49 times more likely to access higher education than one from the lowest income group. This is

because poor students tend to progress less well through primary and secondary education than those coming from the richest income groups with the highest cultural capital, and they are less well prepared academically when they take the KCSE.

Figure 6. Enrollment Rates of Kenyan Students by Income Quintile (2016)



Source: Kenya Integrated Household Budget Survey (KIHBS) 2015/16.

Considering the tuition fee conditions that apply to Kenyan students and the availability of HELB bursaries and loans, the financial aid distribution of the student population shows the existence of five groups of students in the Kenyan higher education system:

- Students enrolled in public institutions who benefit from HELB bursaries/loans to cover a significant part of their expenditures
- Students enrolled in public institutions who are in theory eligible for HELB financial aid but are denied that support for lack of fiscal resources
- Students enrolled in the parallel programs of public institutions who must pay their expenditures themselves
- Students enrolled in private institutions with HELB financial aid
- Students enrolled in private institutions who must pay their expenditures themselves

In addition, student aid is allocated by several government agencies in an uncoordinated way. For instance, students in need of financial support can be eligible for constituency bursaries, county bursaries, government scholarships, and student loans administered by HELB. This has resulted in inappropriate targeting and lack of transparency in the allocation of student aid.

Statistics are not available to show the number of students in each of the above categories, as well as their individual characteristics from an equity viewpoint (income level, gender, ethnic, or geographical origin). Notwithstanding the lack of data on the socioeconomic distribution of the various types of bursaries and loans available to students, it is safe to assume, based on the experience of other countries with similar characteristics as Kenya, that a larger share of government subsidies goes to students from the richer family groups than from the lowest socioeconomic groups and that financing may still be a significant barrier for many needy students. The Kenyan situation is consistent with the extensive international literature showing that the cost of higher education is a deterrent for young people from low-income groups (Blom et al. 2016; Salmi and Surssock 2018).

Looking ahead, the Government of Kenya would be well advised to consider three fundamental issues as it seeks to guarantee the financial sustainability of the higher education system while also improving the equity situation: (a) the need to consolidate existing bursary scheme under one single agency, (b) the tuition fee policy, (c) the design and operation of HELB.

In the first instance, it would be desirable to integrate all existing scholarship and bursary schemes under a single authority to provide one set of eligibility criteria applied across the board, thereby enhancing targeting and effectiveness in the use of sparse public funding. The Kenyan government must decide whether it wants to entrust CUE or HELB with this important responsibility. Merging all scholarship schemes under one roof should be accompanied by efficient and transparent management to ensure smooth operation and increased accountability. One of the factors that exacerbated the #feesmustfall student movement in South Africa is that the financial aid agency, NSFAS, was plagued by poor management and disbursement.

Second, as indicated in Table 10, the most equitable and sustainable approach would be to eliminate the present parallel fee system and move instead to a TFT scheme, following the example of South Africa. This would require shifting from a system of fee exemptions that benefit the most qualified students from an academic viewpoint to a system where the neediest students who qualify for higher education studies would not pay tuition fees.

HELB policies for granting bursaries and loans ought to mirror this new approach. Priority should be given to extending bursaries and loans to needy students and providing loans to middle-class students. This would help address the formidable challenges faced by the Board, as evidenced in a 2016 evaluation of HELB carried out by the World Bank.

HELB is facing unprecedented pressure due the anticipated increase in demand for loans which will accompany the “Tsunami” of students aspiring to enter the post-secondary education system from 2016. At present HELB is unable to dispense loans to meet the current levels of demand, and each year the gap between the demand for funds and HELB resources is expected to increase dramatically. In a context further characterized by rising tuition fees and weak loan recovery mechanisms, further financing gaps are expected to develop in the absence of rectifying interventions. The greatest challenge to HELB is to resolve the financing gap between the demand for student loans and the availability of financial resources (Blom et al. 2016, 44).

Strengthening HELB would require actions on three fronts: (a) better targeting, (b) resource mobilization, and (c) improved loan recovery. As far as targeting is concerned, the 2016 report found evidence that the means testing instrument used by HELB, which looks in particular at household income, gender, number of siblings, and who paid for secondary education, is fairly effective in identifying students with the greatest financial aid needs. However, the report found that there was room for improvement. The MTI scorecard did not fully capture variations in household incomes among loan applicants. HELB could revisit the weights assigned to each indicator to refine the instrument and give priority to low-income students. It would also be important to discriminate more in terms of giving larger sums to the neediest students compared to middle-class students.

With regard to resource mobilization, the 2016 report recommended that “HELB should focus on seeking alternate sources of funding by delegating fund management to local governments and private companies. Initiatives similar to the Afya Elimu Fund, a public private partnership between HELB, USAID, the Kenya Private Sector Alliance and selected government ministries, are critical for establishing sustainable alternative sources of financing in support of higher education” (Blom et al. 2016, 46).

Many factors explain the relative success or failure of any student loan scheme, including design considerations relative to the interest rate and administrative costs, the strength of its leadership, the quality of management practices and systems, and the ability to react rapidly and flexibly whenever problems arise. But loan collection is certainly the most important element. At the end of the day, no matter what type of student loan system operates in a country, it is doomed unless its collection mechanism is designed and operates in an effective manner (Salmi 2017). This is the third area where HELB can improve its operation significantly. In the past few years, the Board has invested a lot to boost loan recovery, notably by tracing loan beneficiaries through employers and statutory bodies such as the KRA, the National Hospital Insurance Fund (NHIF), and the National Social Security Fund (NSSF). To further strengthen loan recovery, HELB could work on improving awareness among loan beneficiaries and their families, introduce a system of moral guarantors, and invest in reliable ICT mechanisms to track graduates.

At present, estimates indicate that HELB is able to finance only about half of the demand for student loans. To help HELB mobilize additional funding, the Kenyan government could consider implementing the recommendations on parastatal reforms made by the presidential task force and allow HELB restructure as a development financial institution. This would give it the right to tap into additional funding sources, including education bonds following the example of the Malaysian student loan agency. HELB could also benefit from resources from the national lottery, following the examples of universities in Chile and Mexico, which the respective governments have allowed to run their own lottery. In Poland, a levy on transactions at the national stock exchange goes to public universities, whereas in Hong Kong SAR, China, horse races managed by the Jockey Club generate significant resources for the public universities.

In any event, traditional, mortgage-type student loan schemes such as the one managed by HELB are vulnerable by design. Without an income-contingent provision, times of economic crisis are bound to cause repayment difficulties, as unemployment rises, and incomes stagnate. International experience shows that income-contingent loans, designed after the Australian and New Zealand model, tend to have higher repayment rates. Not only are they more efficient in terms of loan

recovery through the national tax system, but they are also more equitable since graduates pay a fixed proportion of their income and are exempted from repaying whenever they are unemployed, or their income is below a predetermined ceiling (Box 6).

Box 6. Income Contingent Loans in Australia and New Zealand

Australia and New Zealand, which both charged little or no fees at their public institutions until the late 1980s, adopted similar strategies to increase cost sharing. They raised fees while introducing student loan programs that would allow students to pay for these higher fees over an extended period of time based on their incomes once they completed their education. But the two countries took somewhat divergent approaches in the characteristics of the income contingent repayment schedules they adopted.

In 1988, Australia chose a very innovative approach to cost sharing through its Higher Education Contribution Scheme (HECS). Faced with prospective widespread student opposition to tuition fees, Australian policy makers decided to use public funds to pay the fees while students were enrolled. All students participating in the HECS were then obligated to repay these fees after completing their tertiary education as a percentage of their incomes, although students with below average incomes were exempted from repayment. The HECS applies only to fees, not living expenses.

Beginning in 1990, New Zealand took the somewhat more traditional approach of imposing fees at their public institutions that students and their families would be required to pay upfront when they enrolled. Beginning in 1992, students could borrow to cover the cost of these fees as well as a substantial amount of living expenses. Repayment of these loans would then occur through the income tax system based on a percentage of students' income once they completed their education.

New Zealand and Australia have moved in different directions since they first adopted their income contingent student loan schemes. New Zealand began with a more market-based approach in which virtually all borrowers (who then constituted a small share of students) repaid on the basis of their income, with interest rates slightly below market levels. Over time, New Zealand has moved away from market-based principles by increasing subsidies, including exempting more low-income students from making repayments and waiving interest on most loans. As a result, borrowing has grown substantially over time. The overriding policy concern now is that high debt levels are leading an increasing number of graduates to emigrate from New Zealand to avoid their loan repayment obligations. The government has responded by making repayments for borrowers who remain in New Zealand interest-free beginning in 2006.

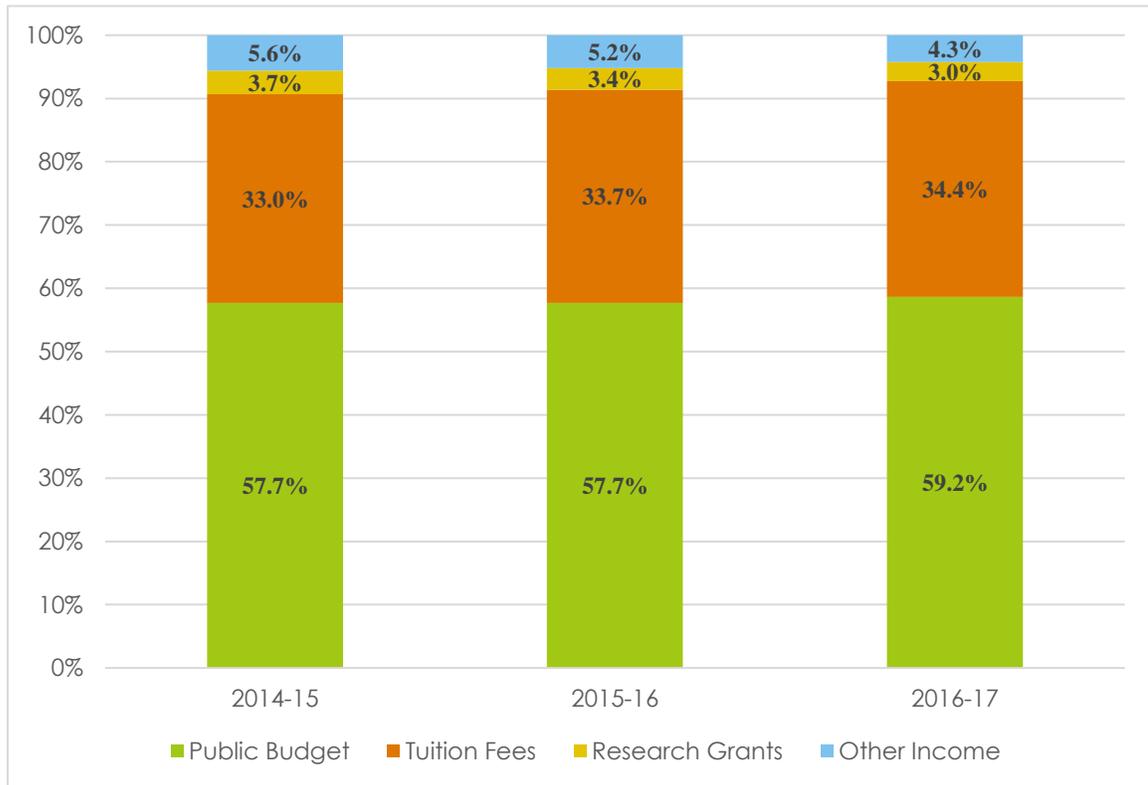
Australia's HECS system, on the other hand, created a public expenditure challenge at first as a growing number of students enrolled in higher education without having to pay fees up front. To reduce pressure on the budget, Australia moved in 1997 toward the market by reducing HECS subsidies and introducing three bands of HECS tuition fees as well as reducing the level of income exempted from HECS repayment. In addition, more market-based loan programs have been developed for the more than one-quarter of students who do not participate in the HECS, including growing numbers of foreign students and domestic students enrolling in fields of study not covered by the HECS. In 2016, the government closed the loophole that allowed Australians living abroad to leave their debt unpaid while being away from Australia. Estimates indicate that, as a result of that loophole, as much as A\$800 million has remained unpaid since the launch of the student loan program in 1989.

Thus, as Australia has moved to a more market-based student loan system, New Zealand has moved away from a market-oriented approach. But in both cases, the income-contingent loan system has contributed to significant increases in coverage and improved equity.

Source: Chapman et al. (2014); Salmi and Hauptman (2006).

Finally, tuition fees already represent a high proportion of the public universities' total income, as illustrated by Figure 7. This means that there is limited room for maneuver to increase this proportion and that the focus of income diversification efforts should be on other sources of revenue, as discussed in the next section.

Figure 7. Main Sources of Funding of Kenyan Public Universities



Source: Universities Education Commission.

Other Sources of Income Diversification

Income generation at the institutional level is the third resource mobilization pillar that the Kenyan public universities can rely on. While the potential for resource mobilization is much more limited in developing countries than in OECD nations, Kenyan universities could actively seek additional resources through donations, contract research, consultancies, continuing education, and other fund-raising activities, as some of them have already done since the government started reducing university budgets in the mid-1990s. Annex 4 presents the range of income generation options and practices that can be found throughout the world.

Not all sources of income have the same potential. Contrary to what is commonly assumed, technology transfer is not, on average, a highly beneficial activity from an income generation viewpoint. Even in the United States, which has a favorable policy framework for innovation and technology transfer, very few institutions hit the jackpot with pathbreaking innovations that can be successfully commercialized and bring in millions as revenue. At Harvard University, income from technology transfer licenses is equivalent to only 1 percent of annual fund-raising receipts. International experience suggests that providing continuing education, undertaking productive activities, and raising funds from alumni and corporations are the three most important income generation sources, especially the last one.

With a few exceptions, fund raising has not been a major priority in all Kenyan public universities until now, on the assumption that resources are limited throughout the economy and that philanthropy is not part of the national culture. However, international experience shows that, even in resource-constrained countries, universities can find a few rich companies and individuals—locally and among members of the diaspora—that can be convinced to make financial contributions to universities if they are approached and presented with good reasons to support the universities. Sometimes, donations can come from the most unexpected quarters, as illustrated by the poignant story of Miss McCarty in the Southern state of Mississippi in the United States (Box 7).

Box 7. The Gift of a Lifetime

Multimillion-dollar gifts to colleges and universities have become almost routine. Bill and Camille Cosby gave US\$20 million to Spelman College. Henry Rowan, who runs a manufacturing business, and his wife, Betty, gave US\$100 million to Glassboro State College, which was then renamed Rowan College of New Jersey. The billionaire Walter Annenberg gave US\$25 million to Harvard and US\$120 million to the University of Pennsylvania.

So, why is it even noteworthy when Oseola McCarty, an elderly black woman, donates US\$150,000 to the University of Southern Mississippi? In the case of Ms. McCarty, it is the heart behind the gift and the lifetime of effort that went into it.

Oseola McCarty spent her entire life making other people look nice. Day after day, for most of her 87 years, she took in bundles of dirty clothes and made them clean and neat for parties she never attended, weddings to which she was never invited, and graduations she never saw. She had quit school in the sixth grade to go to work, never married, never had children, and never learned to drive because there was never any place in particular she wanted to go. All she ever had was the work, which she saw as a blessing. Too many other black people in rural Mississippi did not have even that. She spent almost nothing, living in her old family home, cutting the toes out of shoes if they did not fit right, and binding her ragged Bible with Scotch tape to keep Corinthians from falling out. Over the decades, her savings—mostly dollar bills and change—grew to more than US\$150,000.

After taking out what she needs to maintain her modest life style, she is donating US\$150,000 to the university for scholarships for black students. The University of Southern Mississippi was first opened to blacks only 30 years ago.

Business leaders in Hattiesburg, 110 miles northeast of New Orleans, decided to match her US\$150,000, said Bill Pace, the Executive Director of the University of Southern Mississippi Foundation, which administers donations to the school.

“I’ve been in the business 24 years now, in private fund raising,” Mr. Pace said. “And this is the first time I’ve experienced anything like this from an individual who simply was not affluent, did not have the resources and yet gave substantially. In fact, she gave almost everything she has. No one approached her from the university; she approached us. She’s seen the poverty, the young people who have struggled, who need an education. She is the most unselfish individual I have ever met.”

Ms. McCarty, whose one major regret in life is that she never finished school after having to drop out in the sixth grade, is living proof that dignity and reward in work is what you make of it. She exemplifies donors who struggled to achieve a measure of success in one generation and then reach forward to help the next generation.

In June 1996, Harvard University awarded McCarty an honorary doctorate. In 1998, one year before her death, she was awarded an honorary degree from the University of Southern Mississippi, the first such degree awarded by the university. She received scores of awards and other honors recognizing her unselfish spirit, and President Bill Clinton presented her with a Presidential Citizens Medal, the nation’s second highest civilian award.

Source: <http://www.nytimes.com/1995/08/13/us/all-she-has-150000-is-going-to-a-university.html>;
<http://www.nytimes.com/1995/08/16/opinion/the-gift-of-a-lifetime.html>.

Box 8 summarizes recent progress with fund raising in Europe, a region with little tradition of philanthropy to universities. Even though the economic conditions may be substantially different from those prevailing in Kenya, the fact that European universities are new to fund raising makes their experience relevant. The most important lesson is that success in fund raising is influenced by (a) the prestige and reputation of universities as proxies of their quality, (b) the existence of continuous relationships with different types of donors in the context of a solid fund-raising strategy, and (c) the geopolitical context of the institution.

Box 8. Lessons from Fund-raising Efforts in Europe

A 2011 European Commission survey on the fund-raising efforts of European universities found that success was related to three main factors. The first is what is defined as institutional privilege, that is, the wealth and reputation of the university, as well as preexisting relationships with potential donors. The second is the level of commitment of senior academic leaders and other research staff in this regard. The third and final factor has to do with the environmental of a university, namely its location and the geopolitical context in which it operates.

With regard to the type of donors, the survey showed that European universities raise money mostly from private corporations, while contributions from alumni are much less frequent.

Experience indicates that successful fund-raising involves the following dimensions:

- Commitment of management and governing bodies
- Full participation of academic staff
- Financial and human investment in fund-raising activities
- Rewards for staff successful in attracting philanthropic donations
- Production and dissemination of materials for fund-raising purposes, such as a website, leaflets, and brochures
- Use of a database to maintain and update records on interactions with donors
- Reporting on philanthropy in universities' annual financial reports

One of the successful cases of effective fund-raising efforts came from the United Kingdom, where a government-sponsored matching funding scheme was set up in 2008, following similar positive experiences in the Canadian province of Alberta; the U.S. state of Florida; Hong Kong SAR, China; and Singapore. Between 2008 and 2011, the British government matched any eligible gift made to a participating tertiary education institution.

Sources: European Commission. 2011. *Giving in Evidence: Fundraising from Philanthropy in European Universities*. Brussels. <http://ec.europa.eu/research/era/docs/en/fundraising-from-philanthropy.pdf>.

Universities UK. 2008. "Information for Members: Formal Launch of the Matched Funding Scheme for English HE institutions." *Investor in People*, April 3, London.

While the constraints on public resources will most likely make it difficult for Kenya to put in place a similar matching program, at the very least the government should not penalize the most enterprising higher education institutions by reducing their budget as they become more adept at fund raising. Ministries of Finance are often tempted to cut down the budget allocation to universities that are perceived as successful in raising funds from the private sector or from philanthropists, or they require public universities to transfer to the Treasury any surplus money raised from private sources. These behaviors are self-defeating as they remove the incentives to generate additional income. Positive incentives in the form of matching grants, as described in Box 8, can go a long way toward encouraging universities to be proactive in seeking donations. In the Canadian province of Alberta, when the government introduced a matching grant program in 2006, it was so successful that the amount of philanthropic donations received by the universities exceeded the funds set aside for co-financing by the provincial government. For example, Mount

Royal University, whose expectation was to receive a 1:1 co-financing, could not get more than US\$3 million, even though it had collected US\$16.5 million. (Tetley 2006).

Second, it is important to put in place tax deductions that make it advantageous for firms and individuals to donate money to good-quality tertiary education institutions that serve public good goals (inclusive expansion, relevant training and research). Favorable tax incentives have been found to be crucial for stimulating philanthropic and charitable gifts to tertiary education institutions. In the United States, 2015 was a record year in terms of fund raising, with tertiary education institutions bringing in a total of US\$40 billion. Stanford University alone pulled in US\$1.6 billion, ahead of Harvard with US\$1.1 billion. Canada; Hong Kong SAR, China; several continental European countries; and the United Kingdom also offer generous tax incentives to encourage donations to universities. In Latin America, Brazil, Colombia, and Chile permit income tax deductions. Among developing countries, India has one of the most generous tax concession schemes, as all individual and corporate donations to universities are fully exempt from taxation (World Bank 2002).

From the viewpoint of the universities seeking to increase fund raising, it is important to have an audacious vision and strategic plan to convince potential donors that their contributions will have a profound developmental impact on the receiving institution. Universities must also define clear ethical rules regarding the origin of the funds that they can accept and the types of companies their endowment fund will invest into. The University of Hong Kong, for instance, has ruled out tobacco and arms-producing companies from its list of potential donors. A growing number of universities in North America and the United Kingdom are divesting from fossil fuel and coal.

2.3.3. Potential for Social Innovation

Social innovation, defined as a novel and more sustainable solution to existing social problems in ways that create value for society as a whole rather than just to private individuals, offers promising avenues for mobilizing additional resources and reducing disparities in higher education. For example, innovative forms of resource mobilization can be explored to improve student aid opportunities for low-income groups. In October 2015, the design firm OpenIDEO launched an online challenge to invite the global community to come up with novel ideas to address the financing crisis in U.S. higher education (McNeal 2016). The competition yielded many innovative projects that could well be applied to many country contexts or could in turn spark other audacious income generation initiatives for higher education. Some of the most promising crowd-sourced solutions with an equity dimension are as follows:

- **Tuition Heroes.** The company monitors the annual growth rate of tuition fees and grants a ‘tuition hero’ status to colleges and universities that keep their tuition in line with normal inflation rates. ‘Tuition hero’ institutions receive a badge to display on their websites and in marketing materials. The concept is similar to the way the Energy Star badge gives efficient appliances brand recognition. In this case, higher education institutions are recognized for their efforts to remain accessible to academically qualified low-income students.⁹

⁹ <http://tuitionheroes.com/>.

- **PelotonU.** This project matches working adults who seek a college degree to online programs and provides an office where they can study and receive additional tutoring and mentorship.¹⁰ It guarantees that students will graduate debt free. To achieve this, PelotonU helps the students obtain a government scholarship for low-income students (Pell Grants), employers pay for student support, and local donors provide gap funding.
- **One Day Experience.** The Barcelona-based company helps 15- to 24-year-olds with career counseling.¹¹ It connects young adults who are not yet ready to choose a career and professionals who can give them a sense of what working in their industry would be like. The platform connects the indecisive young people with professionals in their fields of interest and gives them the opportunity to shadow these mentors on the job for a day. The company provides ‘vouchers’ that young adults use to cash in for one day on the job with experts in industries that they are interested in knowing better.
- **Brighter Investment.** Inspired by Kiva, the online microlending organization, Brighter Investment provides a platform for potential donors who want to support university education for high-potential students in developing countries who face financial barriers to getting their degree.¹² Aspiring students sign up with the platform and apply to the university of their choice. Vancouver-based Brighter Investment pools together funds from individual donors to cover the cost of tuition and living expenses. Students repay a share of their income for a set period after graduation.
- **1Gen2Fund.** This is a crowd-funding platform that helps first-generation students successfully complete a four-year college degree.¹³ The platform gives first-generation students who meet certain criteria a place to ask for financial help, receive e-coaching, and access additional support resources. Rather than competing for individual scholarships, students ask directly for funds, while alumni and other donors sign up to provide financial support and mentorship. 1Gen2Fund is a U.S.-based nonprofit organization that operates on a percentage of donations.

Other innovative financial technology initiatives have seen the light since the 2015 OpenIDEO challenge. Bludesks.com focuses on low-income students and students in developing countries.¹⁴ Low-income students register at bludesks.com for discounted prices in on-campus courses in a large network of high-quality higher education institutions. Students receive academic credit for their completed courses and benefit from an on-campus experience. Participating institutions receive additional income by using their capacity more efficiently and get recognition for reaching out to a more diverse student population that otherwise could not afford them.

¹⁰ <https://www.pelotonu.org/>.

¹¹ <http://onedayexperience.es/>.

¹² <http://www.brighterinvestment.com/>.

¹³ <http://www.1gen2fund.com/>.

¹⁴ <http://www.bludesks.com/>.

Questbridge acts as a platform that helps low-income students in the United States get access to top colleges and universities.¹⁵ Started in response to the observation that about 80 percent of the highly qualified students from disadvantaged backgrounds graduating from high school never apply to a top school because of the perceived high cost of studying at a selective university, Questbridge matches students with full four-year scholarship. The students in the program also get help with their applications and support from a network of scholars during their studies.

EdSeed is an app that seeks to match refugee students with potential donors, whether they are individuals, corporations, or foundations. It was set up by an impact investor coming originally from Syria, Rama Chakaki, who observed that the financial barrier is one of the most serious ones faced by refugee students. The Massachusetts Institute of Technology (MIT) Solve refugee education challenge selected edSeed as the most innovative response to the issue of displaced students.¹⁶

In South Africa, the Ikusasa Student Financial Aid Programme (ISFAP) has included in its funding strategy the idea of raising resources through social impact bonds, which are public-private partnership with the aim of funding effective social services through a performance-based contract.

Social Impact Bonds are an innovative method of financing social programs in which governments partner with service providers and private sector investors to fund social programmes. Investors are repaid if and when improved social outcomes are achieved. Thus, government pays only if the services are successful at meeting the needs of its citizens Kippy Joseph (Rockefeller Foundation 2013).

Development impact bonds are a promising variation, where external donor agencies step in on behalf of the governments of developing countries to pay the investors and/or providers of social services if the program actually achieves its objectives and targets, following an independent evaluation. Because of the time element, the results metrics tend to be output measures that verify the completion of activities rather than outcomes that measure impact. In tertiary education, for example, a social impact bond programs could finance access to quality programs for students from underrepresented groups. Progress would be assessed by looking at increased enrollment and completion rates.

If successful, this approach would create a useful precedent for the entire African continent, as social impact bonds have been tried only in the United States, the United Kingdom, Australia, India, and New Zealand. The World Bank recently designed its first development impact bond in Uzbekistan.

¹⁵ <https://www.questbridge.org>.

¹⁶ <https://www.weforum.org/agenda/2017/08/this-app-is-helping-to-fund-education-for-refugees>.

2.4. Resource Allocation

2.4.1. Present Funding System

As is still the case in many developing countries, the resources that the Kenyan universities receive from the government are not allocated on the basis of an objective and transparent funding model but are negotiated directly between the universities and the Treasury, reflecting historical trends, the fiscal situation, and the influence of each university's leadership team. This presents several drawbacks. From the government's viewpoint, the budget is not used as an instrument to ensure that the universities are aligned with the national development objectives of the country. Neither does it have built-in incentives to encourage the universities to be innovative in the types of programs that they set up or in their curricular and pedagogical practices. Since there are no objective criteria to allocate the budget, the per-student allocation that each university receives is not uniform (Table 11). From an equity viewpoint, these funding disparities mean that, depending on which university students are enrolled in, they receive different levels of public subsidy. For example, a student enrolled at the University of Nairobi receives six times the amount of government subsidy that a student attending Machakos University College gets.

Table 13. Per-student Government Allocation in Select Public Universities (2017/18)

Universities	Enrollment	Government Budget (KES, millions)	Per-Student Subsidy (KES, thousands)
University of Nairobi	26,009	6,300	242
Egerton University	15,223	2,800	184
Kenyatta University	21,462	3,100	144
Jomo Kenyatta University of Agriculture and Technology	12,029	1,700	141
Technical University of Kenya	8,636	1,070	124
Technical University of Mombasa	4,520	770	170
University of Eldoret	14,275	1,100	77
Machakos University College	5,056	340	67

Source: CUE.

From the universities' viewpoint, accountability for their use of public funds and their results is very weak as they are not required to submit any annual audits or performance assessments.

2.4.2. Guiding Principles for a Sound Funding System

Based on the lessons arising from analyzing the evolution of funding mechanisms in OECD countries in the past decade, an adequate model for allocating public funds for higher education in Kenya would be well served to apply the following eight principles: (a) close alignment with national priorities, (b) explicit link to performance, (c) equity among all population groups, (d) objectivity and transparency in the allocation process and criteria, (e) consistency and

compatibility among the various financing instruments in use, (f) stability over time, (g) institutional autonomy and accountability, and (h) allocation as a block grant.

- **Link to national priorities.** It is important to achieve full consistency between the national policy goals set by the government to achieve its vision of the future of higher education in Kenya and the funding allocation instruments in place to attain high performance and financial sustainability. Funding without a national strategic orientation serves no useful purpose. Conversely, a higher education development vision and a plan without appropriate financial resources and incentives are unlikely to come to fruition.
- **Performance orientation.** The level of funding that the Government of Kenya allocates to each higher education institution should reflect its performance. International experience reveals that tying the distribution of funds for institutions and/or students to performance measures can make a real difference in the ability of higher education systems to achieve key policy goals. The main dimensions of performance should be defined by indicators reflecting their contribution to access and equity, quality and relevance, research production and knowledge transfer, and efficiency in the use of public resources.
- **Equity in resource allocation.** The distribution of public resources should reflect the principle of equal opportunities for all population groups in Kenya: ethnic groups, income groups, females and males, and youths with special needs. This implies, in particular, that funding should respect the principle of universalism and provide all Kenyan citizens with the same benefits when it comes to access to public funding.
- **Objectivity and transparency.** The rules and criteria for the allocation of public funds to the higher education sector should be objectively defined and fully transparent. The results of each round of funding allocation should be publicly available at all times.
- **Multiplicity of instruments.** No funding mechanism can satisfy all the policy objectives of the Government of Kenya at the same time. It is therefore essential to rely on a combination of instruments that are complementary, consistent, and mutually reinforcing.
- **Stability over time.** Multiyear funding allows tertiary education institutions to plan their reform programs and investment over the medium to longer term in accordance with their strategic plan. University leaders must have a long-term perspective to design and implement the development strategy of their institution, whether it comes to investing in new infrastructure (facilities and labs) or recruiting academic staff. Thus, it is important that the state maintains a reasonable degree of funding stability from one year to the other. This is better achieved with a multiyear budgeting process, as is the case in Denmark; Hong Kong SAR, China; or in the University of California system, for example.
- **Institutional autonomy and accountability.** International experience shows that universities that are fully autonomous are better positioned to become innovative and be responsive to rapidly changing external conditions and evolving labor market needs. At the same time, the higher education institutions and students who receive government subsidies should be fully accountable for the appropriate use of public resources through independent audit mechanisms and clear measures of performance.

- **Block grant allocation.** Rather than organizing the budget into rigidly defined line items, it is good practice, as is already the case in Kenya, to allocate and transfer the funding going to higher education institutions as a lump sum without any strict predetermination of the use of resources by category of expenses. This gives the universities more flexibility in planning and deploying their resources in the spirit of institutional autonomy mentioned earlier.

Table 12 assesses how the Kenyan funding framework stacks up against these principles. It shows that the present funding framework has few dimensions of alignment, except for the block allocation, which is a positive feature to facilitate the flexible use of available resources at the institutional level. However, it could be improved from the viewpoint of making it more performance oriented, offering better guarantees of stability over time, and having a greater diversity of instruments to meet the variety of needs of institutions that have different missions (research, general education, skills formation, and so on).

Table 14. Alignment of Kenyan Funding Framework with International Good Practices

Guiding Principles	Kenya Funding Model	Comments
Alignment with national priorities	+	No direct relationship
Performance orientation	+	No performance criteria considered
Equity considerations	++	Availability of bursaries and loans through HELB
Multiplicity of instruments	+	Only direct budgetary contribution
Objectivity and transparency	+	None
Stability over time	+	No guarantee of stability and no multi-annual budget
Block grant allocation	+++	Already in place
Institutional autonomy and accountability	++	Insufficient

Note: ‘+’ represents weak alignment.

‘++’ means average/reasonable alignment.

‘+++’ is for full alignment.

2.4.3. Options for Strengthening Kenya’s Funding Model

To encourage a more effective use of public resources, the Government of Kenya could introduce a combination of performance-based budget allocation mechanisms that would provide financial incentives for improved institutional results and better alignment with national policy goals (OECD 2007; Salmi and Hauptman 2006). Policy makers may consider the following three types of innovative allocation mechanisms, separately or combined, to achieve this purpose:

- Funding formula
- Performance contracts
- Competitive funds

2.4.3.1. Funding Formula

One of the most transparent and objective methods of distributing funds for recurrent expenditures is to use a mathematical formula linking the amount of resources allocated to indicators of institutional performance such as the number of graduates, the employment rate of graduates, and/or the research output. Examples of countries that have built performance into their funding formulas include:

- Denmark, which has a ‘taximeter model’ in which 30–50 percent of recurrent funds are paid in relation to the number of students who successfully pass exams every academic year;
- The Netherlands, where half of recurrent funding is based on the number of degrees awarded as an incentive to improve internal efficiency;
- Australia, where funding for doctoral students is based on a formula comprising graduates (40 percent), research outputs (10 percent), and research income, including competitive winnings (50 percent).

The recent decision to consider a DUC method that reflects the respective costs of various disciplinary programs is a positive move toward making the budget allocation process more rational, but it has not been implemented yet for lack of fiscal resources.

2.4.3.2. Performance Contracts

Performance contracts are nonbinding regulatory agreements, negotiated between governments and tertiary education institutions, defining a set of mutual obligations. In return for the participating universities’ commitment to meeting the performance targets established in the agreement, the government provides additional funding. The agreements may be with several or all institutions in a given tertiary education system or with a single institution. All or a portion of the funding may be conditional upon the participating institutions meeting the requirements in the contracts. The agreements can be prospectively funded or reviewed and acted upon retrospectively.

Examples of countries or subnational jurisdictions with performance contracts include the following:

- Chile introduced ‘performance agreements’ on a pilot basis in the late 2000s, whereby four public universities volunteered to receive additional resources to implement a carefully negotiated institutional improvement plan with clear progress and outcome indicators. After a positive evaluation, the scheme has since been extended to a large number of public and private universities.
- Costa Rica has sued performance contracts to promote the transformation of four of its five public universities. This is happening in the context of a large loan financed by the World Bank. It is the first time that the government is attempting to influence the behavior and performance of the public universities using financial incentives. The universities have traditionally operated in a totally independent way, receiving their budget directly from the

Ministry of Finance as a set percentage of the national budget, as established by the Constitution of the country.

- Denmark uses ‘development contracts’ setting long-term improvement goals for the institutions.
- Finland has contracts that set out general goals for the entire tertiary education system as well as specific goals for each institution.
- France has allocated about one-third of the recurrent budget through four-year performance contracts since 1989. Payments are made when the contracts are signed, with a post-evaluation to assess the degree and effectiveness of implementation.
- Several U.S. states, for example, Louisiana, Maryland, Michigan, North Dakota, South Carolina, Tennessee, and Virginia, use some kinds of postsecondary education ‘compacts’.

Kenyan universities are expected to sign annual performance contracts with the Ministry of Education to firm up their obligation to prepare and execute strategic plans, have proper budgets in place, and conduct financial and academic auditing. Each university is also expected to meet agreed key performance indicators. If they operate adequately, these performance contracts would be relevant to strengthen internal QA mechanisms and promote good governance. However, implementation of the performance contracts has been uneven so far. It appears that they serve a legal requirement imposed on all public entities in Kenya, and no additional funding is linked to the performance contracts, which defeats the purpose of such instruments. There would therefore be a need to evaluate the current process to identify lessons learned and areas that need to be strengthened to transform these performance contracts into a mechanism that actually rewards those institutions that are more strategic in their outlook and actually achieve better results.

The main advantage of performance contracts is to encourage institutions interested in improving their results on a voluntary basis without central edicts that are not likely to be followed. From the government’s viewpoint, it helps align the behavior of tertiary education institutions with national policy objectives. From the institutional perspective, it brings additional resources to implement the strategic plan, provided the institution has a transformative vision and the actual will to implement it.

International experience indicates that the success of performance contracts depends usually on three factors (Salmi 2017). First, it is good practice to involve, in the negotiation of the performance agreement, someone who can be seen as neutral enough to facilitate a reasonable dialogue between the government and the university leadership. In Chile, former university vice-chancellors, widely respected as ‘wise persons’, played a decisive role in that respect. Second, the Ministry of Education would need to devote sufficient expertise and time to monitor the implementation of the performance contracts. Finally, it is essential to provide additional resources to make the performance contracts into meaningful incentives for improved performance at public universities.

2.4.3.3. Competitive Funds

Competitive funds have proven their value and strength as an effective resource allocation mechanism for transformative investment purposes (Box 9). Under this approach, institutions are generally invited to formulate project proposals that are reviewed and selected by committees of peers according to transparent procedures and criteria. Positive experience in countries as diverse as Chile, China, Egypt, Indonesia, and Tunisia has shown the ability of competitive funds to help improve quality and relevance, promote pedagogical innovations, and foster better management, objectives that are difficult to achieve through funding formulas. The Government of Kenya could consider piloting a competitive fund as a channel for allocating public investment funds to support attempts to improve the performance and quality of higher education institutions, emulating the strategy adopted by the World Bank to select the African Centers of Excellence.

The actual eligibility criteria vary from country to country and depend on the specific policy changes sought. In Argentina and Indonesia, for instance, proposals could be submitted by entire universities or by individual faculties or departments. In Chile, both public and private institutions were allowed to compete. In Egypt a fund was set up in the 1990s specifically to stimulate reforms in engineering education.

Box 9. Effectiveness of Competitive Funds

Well-designed competitive funds can greatly stimulate the performance of tertiary education institutions and can be powerful vehicles for transformation and innovation. One of the first such funds, Argentina's Quality Improvement Fund (FOMEC), which was supported by the World Bank, was instrumental in getting universities to engage, for the first time, in strategic planning for the strengthening of existing programs and the creation of new interdisciplinary graduate programs. Within universities, faculties that had never worked together started cooperating in the design and implementation of joint projects. In Egypt, the Engineering Education Fund helped introduce the notion of competitive bidding and peer evaluation in the allocation of public investment resources. The fund promoted, in an effective manner, the transformation of traditional engineering degrees into more applied programs with close links with industry.

A fundamental prerequisite for the effective operation of competitive funds—and one of their significant benefits—is the practice of transparency and fair play through the establishment of clear procedures and selection criteria, as well as the creation of an independent monitoring committee. In Chile, a second wave of tertiary education reforms was supported by a competitive fund for diversification (development of technical institutes in the non-university sector) and quality improvement of all public universities. Brazil, Mexico, and Uganda have encouraged the formation of advanced human capital in science and technology through competitive funding mechanisms. In all these cases, the participation of international peer review experts has figured prominently.

In countries with a diversified tertiary education system with unequally developed types of institutions, there may be a compelling argument for offering several financing windows with different criteria or for setting up compensatory mechanisms to create a level playing field between strong and weak institutions. In a project supported by the World Bank in Indonesia during the 1990s, three different windows were designed to serve universities according to their actual institutional capacity. In the last tertiary education project financed by the World Bank in China in the early 2000s, the top universities were required to form a partnership with a university in a poor province as a condition for competing. In Egypt, the competitive fund in the Engineering Education Reform project in the late 1980s had a special window for technical assistance to help less experienced engineering schools prepare well-formulated proposals. In Chile, a special window was opened to provide preparation funds for universities requiring assistance in strategic planning and subproject formulation.

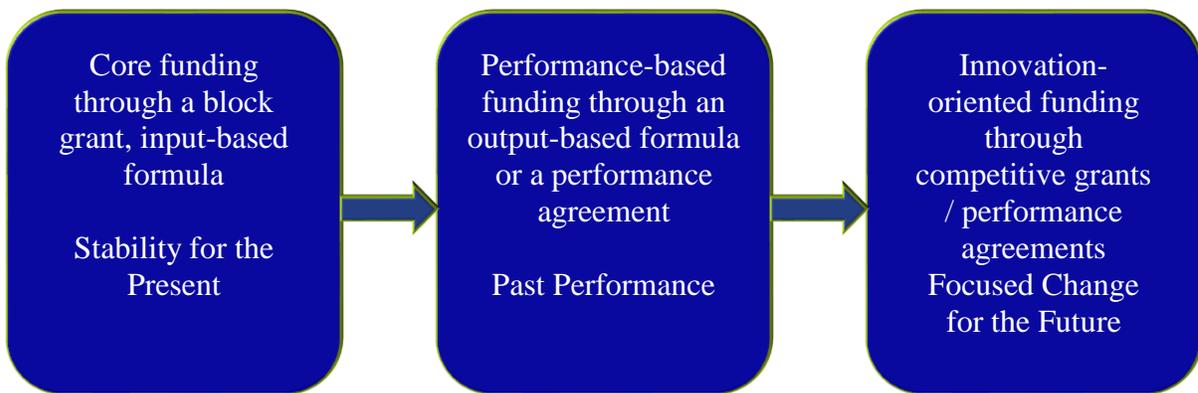
Source: World Bank 2002.

A principal benefit of competitive funds is the practice of transparency and fair play through the establishment of clear criteria and procedures and the creation of an independent monitoring committee. An additional benefit of competitive funding mechanisms is that they encourage universities to undertake strategic planning activities, which help them formulate proposals based on a solid identification of needs and a rigorous action plan.

2.4.4 Adopting a Three-pillar Funding Model

A growing number of countries have realized that it is difficult, if not undesirable, to rely on a single funding instrument because of the diversity of missions and financial needs of higher education institutions. For this reason, one of the most recent trends among OECD countries, especially in Europe, has been to adopt a three-pillar funding model (Figure 8) that allocates resources in different ways depending on the purpose of the funding.

Figure 8. Three-pillar Funding Model



Source: Adapted from Kivistö 2015.

The first pillar is meant to provide the core funding of higher education institutions. This can be achieved through an input-based funding formula with differential weights for undergraduate and postgraduate students and for various disciplines. The second pillar focuses on performance, through an output-based formula or a performance contract. Finally, the third pillar promotes innovative behaviors through competitive grants or performance agreements. Countries that have moved to a three-pillar model, such as Finland, generally allocate from 70 percent to 80 percent of the total budget through pillar one, from 10 percent to 20 percent through pillar two, and up to 10 percent through pillar three.

2.4.5 Allocation of Research Funding

The funding of university-based research is organized in many different ways across the world. These comprise instances in which instruction and research are funded together, performance-based research block grant, competitive research grants, direct funding of Centers of Excellence, demand-side funding, and excellence initiatives (Salmi 2015; Salmi and Hauptmann 2006).

- **Combined core funding for teaching and research.** This is perhaps the most common and traditional approach for financing campus-based research, whereby universities use some of the public resources they receive to pay for the conduct of research in addition to expenditures for academic instruction and institutional operations. Most countries around the globe fund research together with instruction as part of their negotiated budgets or funding formulas. Joint funding of instruction and research has the strength of being the research-funding method most likely to integrate teaching and research efforts. The downside is that the government has little leeway to influence the direction of research or the efficient use of resource funding. From the universities' angle, the risk is that any decrease in core funding could affect the resources available for research adversely.
- **Performance-based block grant funding.** Under this mechanism, which very few countries in the world rely on, universities receive a block grant allocation for research that is not differentiated or earmarked but is based on the past performance of institutions or academic units. Eligibility for the block grant is usually linked to 'institutional demonstrated capacity'. Faculties have wide latitude in setting their own priorities for the use of these funds. The amount of public research funding for each university is based on a periodic peer-reviewed assessment of collective faculty capacity to conduct research in an innovative fashion. In Australia and the United Kingdom, for example, the 'blue skies' approach for allocating research funds—allowing researchers to choose their areas of investigation without being restricted by specific national areas of priority defined by government as in the case of the competitive funding available through the research councils—is based on the results of the Excellence in Research for Australia (ERA) assessment and the Research Excellence Framework (REF) in the United Kingdom, conducted every five to seven years to measure the quality of the research produced in the various departments of the country's universities.
- **Competitive research grants.** This is one of the most common ways of allocating public resources for research. Faculty members apply for funding for specific research projects, which are granted based on peer reviews of proposals. By measuring the quality and potential of proposals in an objective way, the process is somewhat insulated from political pressures. Multiple agencies are usually responsible for funding peer-reviewed research projects. Funding is sometimes provided on a matching grant basis, whereby government funds are complemented by institutional or private sources. This matching grant approach is used in Singapore (three from the government to one from the private sector) and New York State in the United States, for instance. The main risk with peer-reviewed projects lies in the homogeneous selection of peers, with those in the establishment excluding dissenters—which could stifle innovation, result in narrow research agendas, and detract from the quality and relevance of the projects funded.
- **'Centers of Excellence'.** Another way of allocating research funds through block grants is to fund 'Centers of Excellence in Research' at particular institutions that often specialize in certain fields or endeavors. In the United States, the federal government and a number of states have adopted this approach as a way to supplement the research funding embedded in their core funding. New Zealand and the Netherlands are examples of OECD countries that have funded much or all of their academic research through Centers of Excellence. Centers of Excellence in Research have the potential of achieving critical mass and

improving the relevance of research if the focus of the centers accurately reflects national and regional needs.

Some nations—for example, Canada—also fund ‘Chairs of Excellence’. Finally, countries such as France and Germany have traditionally maintained a large network of separate research institutes and centers—CNRS, Max Planck Institute—that operate independently from the universities.

- **Demand-side funding.** In a number of countries, university-based research is funded indirectly through the provision of scholarships, fellowships, and research assistantships in support of graduate students and postdocs. Canada, the United Kingdom, and the United States are prime examples of this demand-side approach in which the multiple agencies that fund research typically have various programs of graduate student support.
- **Excellence initiatives.** Excellence initiatives are hybrid financing mechanisms, which provide significant additional funding to a select group of universities or Centers of Excellence in the countries involved. With a few exceptions (for example, Thailand where nine universities were designated as recipients of the additional funding), the selection of beneficiaries is usually done on a competitive basis. In recent years, Denmark, France, Germany, and the Russian Federation have implemented excellence initiatives, following the example of China, which has had a succession of excellence initiatives in the past 20 years.

The sources of research funding are also varied, including (a) national and state governments through the education ministry or the funding buffer body, (b) national and state research bodies or councils, (c) industry and commerce, and (d) foundations and charities. Table 13 presents a summary analysis of how research funding is distributed in nine high-performing OECD countries.

Table 15. Research Funding Mechanisms in Benchmarked Countries

Research Funding Modality	Countries								
	AUS	CAN	DEN	GER	NET	NOR	SWI	UK	US
Combined core funding for teaching and research		✓		✓	✓		✓		✓
Performance-based block grant funding	✓		✓			✓		✓	
Competitive research grants		✓	✓			✓		✓	✓
Centers of Excellence/ Chairs of Excellence		✓			✓				
Demand-side funding		✓			✓			✓	✓
Excellence initiative	✓	✓	✓	✓		✓			

Source: Salmi 2015.

The table shows that the selected countries rely on a variety of funding instruments that support university research in a complementary way. The main two categories of resources are core funding and competitive grants. The diversification of funding sources has the advantage of

protecting universities from big swings in the level of research financing. Also, it usually allows for separate funding streams to support, at the same time, blue-skies research reflecting the researchers' own initiatives and applied research linked to a nation's specific research priorities.

Using the same categories of research funding, Table 14 shows how resources are allocated in Kenya. It also indicates the amounts for each funding mechanism, making the hypothesis that, on average, research funding accounts for 10 percent of core funding.

Table 16. Research Funding in Kenya

Research Funding Modality	Availability in Kenya	Comments
Combined core funding for teaching and research	No	No objective and transparent criteria
Performance-based grants to top researchers	No	Not available
Competitive research grants	Yes	Significant room for improvement, to link grants to results and policy objectives
Centers of Excellence/Chairs of Excellence	Partially	The African Centers of Excellence could be considered in this context
Demand-side funding	No	No dedicated funding for PhD students
Excellence initiative	No	Not available in Kenya

Source: Elaborated by Jamil Salmi.

It appears that Kenya is far from being at the leading edge when it comes to research funding mechanisms, as it uses only competitive research grants. If the government is willing and able to substantially increase research funding to reach the Vision 2030 goal of 2 percent of GDP, it could consider putting in place additional funding mechanisms that would potentially increase the impact of research activities in terms of economic and social development.

Finally, Table 15 summarizes all the options that the Government of Kenya could consider to design and put in place a sustainable funding strategy for the medium- and long-term development of the higher education sector.

Table 17. Strategic Options for Sustainable Funding in Higher Education

Policy Options	Medium Term	Long Term
Vision and strategic plan for the development of a differentiated higher education system	Elaboration	
Development of non-university public institutions	Strategic decisions	Full implementation
Development of the OUK	Design and establishment	Full operation
Promotion of the private higher education subsector	Removal of regulatory barriers	Incentives to promote development
Three-pillar funding model	Design	Implementation
Funding formula	Design and implementation	
Performance contracts	Design	Implementation

Policy Options	Medium Term	Long Term
Innovation fund	Design	Implementation
HELB	Strengthening of HELB and feasibility analysis for transforming into income-contingent loan scheme	Implementation of income-contingent loan scheme
Higher education management information system	Design and implementation	

Chapter 3. Improving Quality and Relevance in the Kenyan Higher Education System

3.1 Diagnosis of the Present Situation

3.1.1 Proxy Measures of Quality and Relevance

The quality and relevance of higher education programs is one of the most difficult areas to measure anywhere in the world. While at lower levels of education, Ministries of Education use widely accepted metrics and learning achievement tests such as Trends in International Mathematics and Science Study (TIMSS) or Programme for International Student Assessment (PISA) to assess learning outcomes from an international perspective, no such instruments exist for higher education yet, despite promising developments in recent years.¹⁷

In the absence of direct measures of learning outcomes, the global university rankings can be used as a useful proxy to assess the quality of higher education in Kenya from an international viewpoint. In spite of their methodological limitations (bias toward hard sciences, arbitrary choice of weights of indicators), international rankings help identify which universities tend to offer high-quality teaching with innovative curricula and teaching methods, produce graduates who excel in the global labor market, and significantly contribute to progress in knowledge through their cutting-edge research.

Neither the Shanghai Academic Ranking of World Universities nor the Times Higher Education World University Ranking features any Kenyan university in their lists of top 800 institutions, whereas Makerere University is in the 501–800 group in the Shanghai ranking. Table 16 shows the rank of the top Kenyan universities appearing in the Webometrics ranking, together with the rank of the top university in other Sub-Saharan African countries, indicating the relatively high position of Kenya among its African peers.¹⁸

¹⁷ The OECD elaborated tests to measure the acquisition of generic competencies and professional skills in the areas of economics and engineering, which were piloted in 2012 in the context of the Assessment of Higher Education Learning Outcomes (AHELO) project. In the United States, a growing number of institutions have been using one of three assessment instruments to measure added value at the undergraduate level: the ACT Collegiate Assessment of Academic Proficiency (CAAP), the ETS Proficiency Profile (EPP), and the Collegiate Learning Assessment (CLA). Similar instruments have been applied in other OECD countries, such as Australia's Graduate Skills Assessment. A few Latin American countries—Brazil, Colombia, and Mexico—have also been pioneers in that respect, as Jordan has been in the Middle East.

¹⁸ Webometrics, produced by the Cybermetrics Lab (a unit of the National Research Council, the main public research body in Spain), compares 4,000 higher education institutions in the world and measures them on a scale of 1 to 5 across several areas that purport to their visibility on the Internet as a proxy of the importance of the concerned institution.

Table 18. Webometrics Ranking of Kenyan Universities and Comparators (2018)

Name of University	World Rank
University of Cape Town	272
University of Nairobi	993
Makerere University	1036
University of Ibadan	1148
Kenyatta University	1598
Egerton University	1884
Moi University	1954
University of Zimbabwe	1977
Jomo Kenyatta University of Agriculture and Technology	2773

Source: Webometrics 2018. <http://www.webometrics.info/en>.

From a regional perspective, five Kenyan universities appear among the top 100 African universities in the Webometrics ranking, with the University of Nairobi being ranked 9 on the continent, right after 8 South African institutions (Table 17).

Table 19. Top 100 Universities in Sub-Saharan Africa (2019)

Country	Number of Universities	Rank of the Best University from Each Country
South Africa	18	1
Kenya	5	9
Uganda	2	11
Nigeria	10	15
Ghana	3	19
Ethiopia	2	21
Tanzania	3	26
Zimbabwe	1	33
Sudan	1	38
Mozambique	1	39

Source: Webometrics 2019. <http://www.webometrics.info/en/Sub-Saharan>.

While there has been no systematic evaluation of quality standards in Kenyan universities in recent years, it appears that rapid enrollment growth in the universities has come at the expense of quality. Pedagogical practices continue to be very traditional in many higher education institutions, with overreliance on rote learning and outdated curricula that tend to be excessively theoretical.

Equally problematic for universities is the overall decline in quality. This is evident in the declining resources for teaching and infrastructure, poor governance and outdated approaches to teaching, curricula and assessment. All of this has left universities unable to maintain high quality teaching and learning (The Conversation 2018).

The public budgets allocated to the universities have not increased at the same pace, meaning that the capacity to fund the needed human and educational resources has not been sustained. In October 2016, CUE conducted an audit of the public universities, whose findings were of great concern.

... the institutions are operating on a US\$100 million budget gap, effectively hurting efforts to increase student intake and improve the quality of learning. In a February [2017] assessment of public universities, the auditor general listed 11 of the country's institutions as being insolvent. The University of Nairobi, the second biggest institution by student numbers, was on the list and it has warned that the decision to cut allocations will significantly affect service delivery (Nganga 2017).

Government statistics indicate that the number of academics teaching at public universities has grown by only 13 percent between 2011 and 2018, while student numbers rose fivefold (Nganga 2019). Even though the government has accelerated the production of postgraduate degree holders who are candidates for recruitment as university faculty members, many Kenyan universities do not have sufficient numbers of qualified staff, which undermines the quality of the training offered. A recent joint study by the German Academic Exchange Service (DAAD) and the British Council revealed that "most of the universities commissioned over the past 10 years have fewer than five professors and over half of the teaching staff in public universities do not have PhDs. This state of affairs is worse in private universities and newly formed state-funded institutions. In established universities, only 5% of the teaching fraternity are associate or full professors and 40% of academic staff hold doctoral degrees" (Nganga 2019).

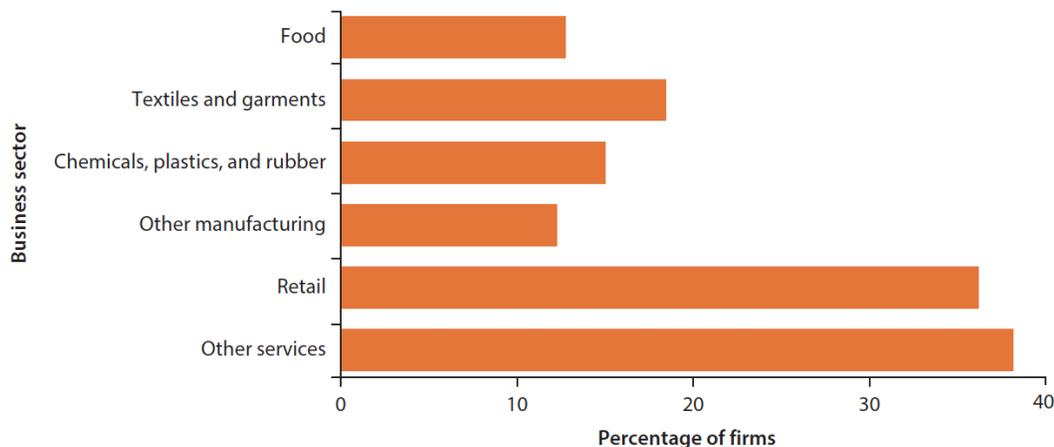
The direct result of this growing gap between student enrollment and availability of qualified faculty is that student-teacher ratios have soared over the years, reaching close to 70:1 in several public universities (World Bank 2016). The 2016 World Bank report on higher education in Kenya had already signaled this negative trend, reporting cases of academics teaching in more than five universities at the same time (World Bank 2016).

In addition, industrial actions often interrupt university life. The frequent strikes affecting the campuses of Kenyan public universities contribute to their low performance. Almost every year, the public universities stop functioning between a few days and several months as a result of salary disputes between the Lecturers' Union and the government. In 2017, for example, the students lost almost an entire trimester because of a 54-day strike by the lecturers. The lecturers went on strike again for 38 days at the end of that same year and again in March 2018. It is the students who suffer most from these disruptions.

3.1.2 Labor Market Results

Another important way of measuring quality consists in looking at the relevance of the programs offered by the Kenyan higher education system from the viewpoint of the labor market results of graduates. Although limited information is available, evidence suggests that Kenyan firms find it difficult to hire employees with the right competences and skills. The 2013 World Bank Enterprise Survey indicated that close to 30 percent of firms surveyed reported “an inadequately skilled workforce as their most important constraint inhibiting growth.” Figure 9 shows the percentage of firms suffering from skills shortages in various economic sectors. This is confirmed by other sources indicating that university graduates cannot find adequate jobs for lack of the types of skills sets sought by firms (Mburu 2014). As a result, many of them resort to ‘academic writing’ as a way of generating some income. Kenya has been recently identified as the main hot spot of essay mills serving students in the United Kingdom and the United States predominantly (Nakweya 2019b).

Figure 9. Percentage of Firms in Kenya Identifying an Inadequately Educated Workforce as a Major Constraint



Source: World Bank Enterprise Survey 2013.

The skills gap is particularly acute in the IT sector, which is expected to become one of the strong pillars of the Kenyan economy. According to a recent report, “... Though digital jobs have to potential to create significant employment opportunities in Kenya, there is a shortage of IT professionals, which is expected to grow. The IT skills gap is star; deficiencies in the current formal education system are the major contributing factor, since most universities fail to keep up with evolving skill demand. All stakeholders agreed that public universities in Kenya do not provide the right skills to match market needs” (Youth Impact Labs 2019).

One of the major sources of disconnection is the imbalance in the distribution of higher education programs. About 75 percent of Kenyan students are enrolled in the humanities and social sciences, whereas firms are eagerly searching for STEM graduates with the right skills sets, not only the technical skills needed for the professional work but also the cognitive and socio-emotional skills that characterize the labor markets in the digital era, as described Chapter 1.

The results of the 2019 placement decisions of high school graduates illustrate the challenges faced by Kenyan universities in selecting programs that are aligned with labor market needs. Statistics released by the Kenya Universities and Colleges Central Placement Service reveal that 98 programs offered by 40 universities did not find any takers by the new students. This suggests that universities must do a better job researching actual needs before opening new programs and have the courage to close obsolete programs rather than teaching what lecturers are comfortable with.¹⁹ In the words of the new Minister of Education:

“I ask the CUE and individual universities to keep reviewing their curricula to make their programmes more responsive to the changing needs of the country. ... We have allowed our intellectual capabilities to go to sleep because of other people and we cannot blame those people because they do not know what a university is; we are the ones who know. Why are universities introducing some very funny and irrelevant courses which only attract two to five students? We cannot continue like this and I want to put it clear that when you come to me asking for funding, I will first ask you to show me what you have done.”²⁰

The lack of comprehensive labor market information is a major impediment for aligning higher education programs with labor market needs and trends. In 2016, the World Bank study diagnosed an incomplete labor market information system.

Kenya’s current system for tracking the dynamics of the labor market, the Labor Market Information System (LMIS), is weak and is undermined by poor coordination. Strengthening the LMIS will be critical to ensure that accurate labor information is shared with universities and students in a timely manner (World Bank 2016, 25).

Little progress has been achieved in the past few years, making it difficult for university leaders, parents, students, employers, and the government to monitor the degree of convergence (or lack thereof) between available programs and the evolving labor market.

3.1.3. Research and Technology Transfer Outputs

To assess the research output of Kenya in a comparative perspective, Table 18 presents the evolution of the number of citable documents relative to the population between 2010 and 2017, corresponding to the quantitative dimension of research production, and the country’s H-index, which measures the quality and impact of that research.²¹

¹⁹ <https://www.universityworldnews.com/post.php?story=20190419105918119>.

²⁰ <https://www.the-star.co.ke/news/2019-04-16-alarm-as-2018-kcse-candidates-snub-98-university-courses/>.

²¹ The H-index is a bibliometric index developed in 2005 by Professor Jorge Hirsch, a physicist at the University of California. A researcher’s H-index score is the maximum number of publications for which each publication is cited at least that many times. The index is based on the set of the scientist’s most cited papers and the number of citations that the scientist has received in other publications. According to higher education expert Alex Usher, the H-index is better than many other bibliometric measures in that it considers both productivity and impact, is not biased by a small number of very successful articles, discounts the value of papers that are not influential, and uses only publicly available data (Usher 2012).

Table 20. Research Output of Kenya and Comparator Countries (2010 and 2018)

Country	Citable Documents per 1 Million Inhabitants (2010)	Citable Documents per 1 Million Inhabitants (2018)	H-Index (2018)
Ethiopia	9.2	181.6	125
Ghana	30.4	516.4	129
Kenya	36.3	565.1	216
Nigeria	31.6	366.2	166
Rwanda	12.8	173.9	70
Senegal	29.8	546.9	111
South Africa	229.2	4,233.5	391
Tanzania	17.8	248.3	145
Uganda	25.6	323.3	156
Zimbabwe	24.6	561.2	119

Source: SCImago. SJR: SCImago Journal & Country Rank. <https://www.scimagojr.com>.

The data clearly show that Kenya is the second research powerhouse in Sub-Saharan Africa, after South Africa. If South Africa is not included in the picture, Kenya not only leads the pack in terms of quantitative production (number of citable documents), but more importantly it is also plainly ahead in the quality and impact of the research produced, as evidenced by its higher H-index.

Another useful indicator of scientific achievement is the number of top researchers available in a country's universities. In the 2018 edition of the list of highly cited scientists compiled by Clarivate Analytics for the 2006–2016 period, the Kenya-based International Livestock Research Institute is the only institution hosting a top-level researcher.²² By contrast, South Africa has 9 highly cited scientists among the 6,000 who make the worldwide list. China has 482, up from only 2 in 2001.

An interesting new measure of rapid progress in scientific production, recently developed by a team working for the prestigious journal, *Nature*, gives an idea of which Kenyan research institutions are advancing fastest.²³ Table 19 shows the countries with the top 50 'rising stars' in Africa. In addition to research institutions from South Africa (11), the list also includes some from

²² Highly Cited Researchers from Clarivate Analytics is an annual list recognizing leading researchers in the sciences and social sciences from around the world. The 2018 list contains about 6,000 Highly Cited Researchers in 21 fields of the sciences and social sciences, focusing on journals indexed in the Web of Science Core Collection during 2006–2016 (4,000 in specific fields and about 2,000 for cross-field performance). Highly Cited Papers are defined as those that rank in the top 1 percent by citations for field and publication year in the Web of Science.

²³ Nature Index 2018 Rising Stars identifies the ascendant performers in the world of science, using the power of the Nature Index, which tracks the high-quality research of more than 8,000 global institutions. The 2018 index profiles the universities, research institutions, and countries that have significantly improved their scientific output, often without the longevity and resources that benefit many of the more established institutions that are prominent in the international academic rankings. The institutions and countries analyzed in the index have significantly increased their contribution to a selection of top natural science journals—a metric known as weighted fractional count (WFC)—in 2017. Each year, the Nature Index publishes tables based on counts of high-quality research outputs in the previous calendar year. It is important for users to understand that the data behind the tables are based on a relatively small proportion of total research papers, that they cover the natural sciences only, and that outputs are non-normalized (that is, they do not reflect the size of the country or institution, or its overall research output).

Egypt (5); Tunisia (2); and one each from Algeria, Benin, Congo, Ethiopia, Mali, Madagascar, and Tanzania. No Kenyan institution appears in that list.

Table 21. Top 25 Rising Stars in Africa (2018)

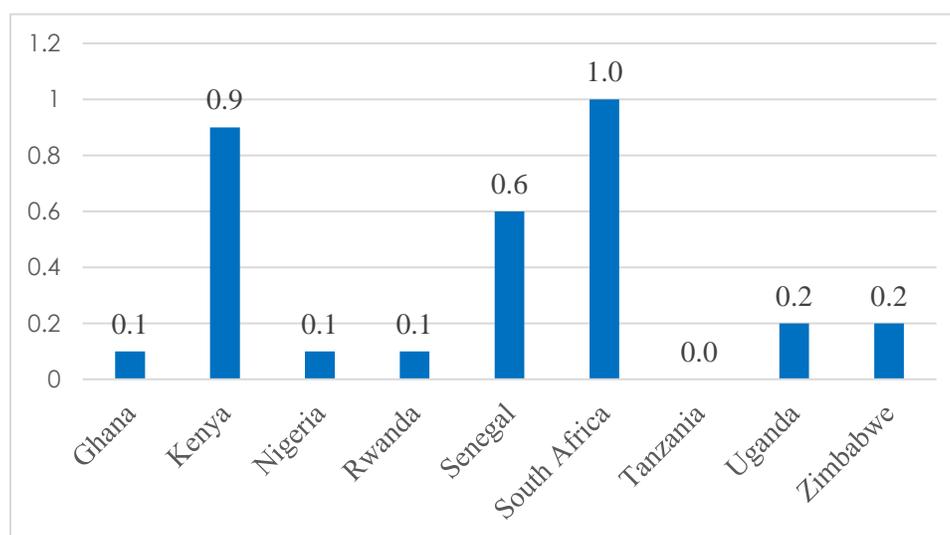
Country	Number of Rising Stars	Rank of the Best Institution
South Africa	11	1
Egypt	5	7
Tunisia	2	18
Benin	1	11
Mali	1	13
Congo	1	19
Madagascar	1	19
Ethiopia	1	21
Tanzania	1	24
Algeria	1	25

Source: Nature 2018. <https://www.natureindex.com/annual-tables/2018/institution/academic/all/regions-Africa>.

The fact that no Kenyan university is included in this ranking of high-performing universities means that, even though several Kenyan universities have relatively good research production results relative to other Sub-Saharan African countries, none of them are showing ‘star’ potential in terms of rapidly accelerated output.

Finally, measures of technology transfer indirectly capture the contribution of Kenya’s universities to the national innovation system and to the development of the regions that they serve. Figure 10 indicates the number of patents relative to GDP in Kenya and comparator countries. Kenya has promising results, almost as good as South Africa, showing a high level of patent production relative to other countries on the continent.

Figure 10. Patents for Kenya and Comparator Countries (Relative to PPP US\$ GDP, 2018)



Source: Global Innovation Index. <https://www.globalinnovationindex.org/gii-2018-report>.

Note: PPP = purchasing power parity.

3.2 Improving Quality and Relevance at the Institutional Level

Improving the quality and relevance of Kenyan higher education institutions requires a combination of interventions:

- Better preparation of incoming students
- Enhanced qualification of academics
- Innovative curricular and pedagogical practices
- Closer links to industry
- Increased internationalization
- Strengthened research capacity

3.2.1 Better Preparation of Incoming Students

The first determinant of the quality of university education in any country is the level of academic preparation of incoming students. By requiring that candidates achieve at least a ‘C–‘ when taking the KCSE, CUE has already raised the bar to increase the likelihood of success of new students. The commission could further help improve the chances of incoming students through the following four measures:

- Improvement in primary and secondary education
- Strengthening of academic counseling programs
- Development of bridge and outreach programs
- Introduction of foundation courses in the first year of university education

Primary and secondary education improvement. As underlined by the 2016 World Bank report, one of the priorities for the Kenyan government should be to strengthen math and science education at the primary and high school levels and encourage more students to view STEM programs as attractive careers early on. Putting in place mentoring activities and scholarships targeting girls is particularly important to ensure gender balance in STEM programs.

Academic and career counseling. A solid and comprehensive system of academic and career counseling represents an essential instrument to improve the transition from high school to higher education, especially for students from underprivileged backgrounds who often lack the information and motivation to pursue their studies. CUE would be well advised to assess the effectiveness of existing services in Kenya.

A career information and guidance system can be defined as a set of tools and services intended to assist individuals of any age in making educational, training, and occupational choices and managing their careers (Watts and Fretwell 2004). To operate in an effective manner, the career

information and guidance system must be designed and put in place as a coherent system bringing all necessary stakeholders together, including the Ministry of Education, Ministry of Labor, Ministry of Economy, all higher education institutions, Chambers of Commerce, and so on. It must rely on sound measurement tools for assessing quality throughout the system, including the quality of the information offered to students and graduates. The system should facilitate information access, allow for self-help and self-development, lead to increased use of ICTs, and promote interaction among higher education institutions, the private sector, and nongovernmental organizations (NGOs).

Bridge and outreach programs. Along the same lines, programs that link higher education institutions to the lower levels of education through outreach and bridge activities can also be effective in improving transition rates and raising the probability of success in higher education, especially for at-risk students. Outreach and bridge interventions seek to reduce the academic, aspirational, informational, and personal barriers that restrict access among students currently underrepresented in higher education.

Foundation courses. Finally, the universities can offer foundation courses to allow students to catch up on subjects where they have weaknesses. In this context, Kenyan universities could embrace predictive analytics as a promising avenue for identifying at-risk students and reducing dropout rates, especially among first-generation students (Box 10). A recent survey estimated that about 40 percent of U.S. universities have experimented with novel data analysis methods to follow the digital footprint of their students and detect, very early on, behavioral changes associated with potential academic difficulties (Ekowo and Palmer 2016). Administrators and professors can use digital dashboards and ‘heat maps’ that highlight who might be in academic trouble. Ball State University in Indiana monitors not only the academic engagement of students but also their social activities to identify unexpected shifts in patterns that may reflect study difficulties. Retention specialists immediately contact the students to offer academic or psychological support as needed. Special attention is given to low-income students through a mobile app. The eAdvisor system of Arizona State University (ASU), which flags students at risk of lagging behind, is credited with a significant increase in completion rates for students from vulnerable groups, from 26 percent to 41 percent, since its establishment in 2007.

Box 10. The Promise of Predictive Analytics

The experience of Georgia State University (GSU) in Atlanta is perhaps the most telling example of the use of predictive analytics in the United States. GSU, whose students are 60 percent nonwhite, and many are from first generation families, uses predictive analytics to advise students on which majors they are most likely to succeed in, based on their grades in prior courses (Blumenstyk 2014; Kamenetz 2016). GSU relies on an early-warning system built on the analysis of 2.5 million course grades received by students over 10 years to identify the critical factors that reduce chances to graduate. For example, an academic adviser will get a red flag if a student does not receive a satisfactory grade in a course needed in her or his major or does not take a required course within the recommended time, or signs up for a class not relevant to his or her major. The university has obtained impressive results: graduation rates are up 6 percentage points since 2013; to get their degree, graduates are spending on average a semester less than before, saving an estimated US\$12 million in tuition; and low-income, first-generation, and minority students have closed the graduation rate gap, even in challenging STEM majors.

Source: Salmi and Orjuela 2018.

3.2.2. Enhanced Qualifications of Academics

The government's plan is to increase the yearly production of PhDs from the current 700 to 1,000. In 2018, CUE announced that all assistant lecturers should hold a PhD. To meet the growing demand for qualified academics and the shortfall in PhD holders, the universities can address staffing needs in the following ways: (a) expanding master's and PhD programs to hire their graduates into the system; (b) training Kenyan students abroad; (c) attracting expatriates with the required qualifications (providing higher remuneration packages compared to their Kenyan colleagues); and (d) covering staff gaps through the contracting of academic staff on a part-time basis in other universities, in addition to their work in the primary employing institution.

It is important to find the right balance among local training, training of students abroad, and hiring of expatriates. Each of these options has advantages and drawbacks. In-country training allows easier integration of graduates into local institutions due to their knowledge of the culture, values, and expectations. Training students abroad is expensive and can lead to brain drain, which depletes the stock of highly qualified staff in the country. To tackle this issue, Kenyan universities should rely increasingly on 'sandwich' PhDs, which combine international and in-country studies, often with two supervisors, one at home and one in the foreign partner university.

In addition, it is important to strengthen the supervision of PhD students. Presently, only 10 percent of those who start a doctoral program actually graduate. All the research-intensive universities in Kenya should follow the example of the University of Nairobi, which has just put in place an online monitoring system to help increase completion rates among PhD candidates.

An essential factor to strengthen the quality of teaching, learning, and research in Kenyan universities is to improve the gender balance by significantly increasing the proportion of qualified female academics. Efforts to that effect are needed not only from an equal opportunity and social justice viewpoint but even more importantly because diversity among instructors and professors is known to produce better results in terms of academic excellence and decision-making capacity in universities, as demonstrated by several pieces of research (for example, Page 2008; Woolley and Malone 2011).

When Harvard University committed to take the gender imbalance issue seriously in the mid-2000s, it adopted the following seven measures:

- Appointment of strong leaders to deal with the issue of diversity
- Establishment of a high visibility office responsible for promoting diversity
- Dissemination of relevant research results on the importance of diversity and successful policies to improve the situation
- Constant improvement of recruitment and promotion policies and practices
- Support for the families of academics
- Evaluation of the impact of the university's policies

- Participation in networks of partner institutions to share good practices and relevant lessons

Based on international experience, Kenyan universities ought to create each an office dedicated to the promotion of diversity, responsible not only for facilitating the recruitment and support of female teachers (retention, promotion, work environment, mentoring, balance of professional and personal life), but also the promotion of diversity within the student body and the elimination of all forms of direct and indirect discrimination against female students.

3.2.3. Curricular and Pedagogical Innovations

The focus of curricular and pedagogical reforms should be on modernizing program content and making delivery more effective. In their efforts to provide incentives for higher education institutions that were interested and willing to transform their educational approach, the Kenyan authorities must encourage the universities to move away from traditional teaching methods and make teaching and learning more interactive, collaborative, and experiential. Today's cohorts of young students—often described as the e-generation or Renaissance kids—have grown up with the Internet and been learning since their young age from computer screens, websites, and visual media. Traditional ways of teaching have been found increasingly unsuccessful in engaging and motivating the e-generation. Mounting evidence provided by the cognitive and learning sciences indicates that interactive pedagogical approaches facilitate an effective learning experience. As the Institute of Play's mission statement explains, ... “our world is changing so quickly that we can only begin to imagine what the future will hold. But we are failing to teach our kids the skills and knowledge they need to succeed in today's world. So how will we prepare them for jobs that haven't even been invented yet? The real work of a 21st century education is to spark the passion for lifelong learning that our kids will need to navigate their way to a promising tomorrow.”²⁴

The establishment of well-resourced Teaching and Learning Centers in all higher education institutions should become a priority in support of pedagogical innovations that would facilitate active learning (design-based or problem-based learning, gaming, simulations, role playing, peer-to-peer learning, AI software for independent learning, and so on). These centers can rely on a range of training activities, including capacity-building workshops and mentoring, to support the development of innovative pedagogical approaches among the teaching staff. The CUE could provide seed funding to set up such Teaching and Learning Centers and help organize virtual learning platforms where academics could share good practices and learn from each other, following the model of the recently-created OneHE platform.²⁵

Box 11 illustrates an innovative approach based on peer learning, pioneered by Professor Eric Mazur, Dean of Applied Physics at Harvard University. Maastricht University and Roskilde University, the youngest universities in the Netherlands and Denmark, respectively, have been European pioneers in the development of problem-based approaches to teaching and learning in all their programs.

²⁴ <http://www.instituteofplay.org/about/>.

²⁵ <https://onehe.org/>

Box 11. Twilight of the Lecture: “Active Learning” Overthrowing the Style of Teaching That Has Ruled Universities for 600 Years

In 1990, after seven years of teaching at Harvard, Eric Mazur was delivering clear, polished lectures and demonstrations and getting high student evaluations for his introductory Physics 11 course, populated mainly by premed and engineering students who were successfully solving complicated problems. Then, he discovered that his success as a teacher “was a complete illusion, a house of cards.”

The epiphany came through an article in the *American Journal of Physics* by Arizona State professor David Hestenes. He had devised a very simple test, couched in everyday language, to check students’ understanding of one of the most fundamental concepts of physics—force—and had administered it to thousands of undergraduates in the southwestern United States. Astonishingly, the test showed that their introductory courses had taught them “next to nothing,” says Mazur: “After a semester of physics, they still held the same misconceptions as they had at the beginning of the term.”

Mazur tried the test on his own students. To Mazur’s consternation, the simple test of conceptual understanding showed that his students had not grasped the basic ideas of his physics course: two-thirds of them were modern Aristotelians. “The students did well on textbook-style problems,” he explains. “They had a bag of tricks, formulas to apply. But that was solving problems by rote. They floundered on the simple word problems, which demanded a real understanding of the concepts behind the formulas.”

Some soul-searching followed. “That was a very discouraging moment,” he says. “Was I not such a good teacher after all? Maybe I have dumb students in my class. There’s something wrong with the test! How hard it is to accept that the blame lies with yourself.”

Serendipity provided the breakthrough he needed. Reviewing the test of conceptual understanding, Mazur twice tried to explain one of its questions to the class, but the students remained obstinately confused. “Then I did something I had never done in my teaching career,” he recalls. “I said, ‘Why don’t you discuss it with each other?’” Immediately, the lecture hall was abuzz as 150 students started talking to each other in one-on-one conversations about the puzzling question. “It was complete chaos,” says Mazur. “But within three minutes, they had figured it out. That was very surprising to me—I had just spent 10 minutes trying to explain this. But the class said, ‘OK, we’ve got it, let’s move on.’”

“Here’s what happened,” he continues. “First, when one student has the right answer and the other doesn’t, the first one is more likely to convince the second—it’s hard to talk someone into the wrong answer when they have the right one. More important, a fellow student is more likely to reach them than Professor Mazur—and this is the crux of the method. You’re a student and you’ve only recently learned this, so you still know where you got hung up, because it’s not that long ago that you were hung up on that very same thing. Whereas Professor Mazur got hung up on this point when he was 17, and he no longer remembers how difficult it was back then. He has lost the ability to understand what a beginning learner faces.”

This innovative style of learning grew into ‘peer instruction’ or ‘interactive learning’, a pedagogical method that has spread far beyond physics and taken root on campuses nationally. Every year, Mazur gives nearly 100 lectures on the subject at venues all around the world.

Interactive learning triples students’ gains in knowledge as measured by the kinds of conceptual tests that had once deflated Mazur’s spirits. “In a traditional physics course, two months after taking the final exam, people are back to where they were before taking the course,” Mazur notes. “It’s shocking.” Peer-instructed students who have actively argued for and explained their understanding of scientific concepts hold onto their knowledge longer.

Such pedagogical invention is not just a trial-and-error endeavor. Rigorous evaluations using statistical analysis can help distinguish the most promising innovations. For his part, Mazur has collected reams of data on his students’ results. End-of-semester course evaluations he dismisses as nothing more than “popularity contests” that ought to be abolished. “There is zero correlation between course evaluations and the amount learned,” he says. “Award-winning teachers with the highest evaluations can produce the same results as teachers who are getting fired.” He asserts that he is “far more interested in learning than teaching,” and envisions a shift from “teaching” to “helping students learn.” The focus moves away from the lectern and toward the physical and imaginative activity of each student in class.

Source: Lambert 2012.

Franklin W. Olin College of Engineering, a young private university located in Wellesley, just South of Boston in Massachusetts, is perhaps one of the best examples of an institution embodying the radical transformation that interactive, collaborative, and experiential learning calls for. Olin College opened its doors in 1999 with an audacious charter: offering an experimental laboratory for remaking engineering education. Started in response to the observation that STEM education is in crisis in the United States because it fails to attract the right students, because is teaching the wrong curriculum, and is using methods that are known to be largely ineffective, Olin aims to train the engineer of the 21st century, “a person who envisions what has never been and does whatever it takes to make it happen” (Buderi 2014).

Olin College operates with several innovative features. To identify future innovators and leaders, it recruits its students not primarily on the basis of their test scores and grades but through face-to-face interviews in multiple settings, including team exercises. Learning is primarily organized around project- and design-based activities performed by students working in teams. Olin College has no academic departments and does not offer tenure to its faculty members, resulting in an academic culture emphasizing interdisciplinary learning and educational innovation. A typical program will involve several teachers from different disciplines providing integrated courses with interdisciplinary material. The curriculum combines engineering, entrepreneurship, and humanities in a unique way. Every Olin student must start and run a business to graduate and must complete a yearlong senior design project sponsored by industry. The students are also expected to acquire leadership and ethical competencies through social sciences and humanities courses. For that purpose, Olin students cross-enroll at Babson College and Wellesley College for entrepreneurship and humanities courses, respectively. To ensure that all Olin graduates are successful at communication in a professional setting, every student is required to present some aspect of their academic work in a public setting at the end of every semester.

Fifteen years after the project was launched, Olin College can boast impressive results. In 2014, Forbes Magazine ranked Olin 8 in the United States for highest Scholastic Aptitude Test (SAT) scores of incoming students. Based on a survey of 130,000 students, Princeton Review placed Olin in the top 20 in 15 categories, including number 3 for students studying the most and number 19 for the happiest students in the nation. The testimony of a typical Olin student reflecting on the learning culture of the college would be, “I’ve never worked this hard in my life and there’s nothing else I’d rather be doing” (Buderi 2014). Olin has been particularly successful in attracting young women into engineering education. While the proportion of women in engineering education is about 20 percent in the United States, it ranges from 40 percent to 50 percent at Olin. Olin graduates have outstanding career opportunities. According to a recent survey, 97 percent of Olin alumni were either employed—in a company or in a business they started themselves—or attending graduate school (22 percent of those at Harvard, Stanford, or MIT). Companies sponsoring senior year projects often recruit the students involved as permanent employees after they graduate.

A few countries have moved to set up a specialized agency dedicated to the promotion of good teaching and learning practices. Australia’s Office for Learning and Teaching, established in 2011 under the authority of the Ministry of Education, is a relevant example in that respect. It operates with an annual budget of about US\$12 million; its main activity consists in offering competitive grants to academics interested in exploring and implementing innovative teaching practices. The office also contributes to policy and dissemination work on the topic, as well as managing awards

to recognize teaching excellence throughout the Australian tertiary education system. The United Kingdom's recent teaching excellence initiative also aims at encouraging universities to introduce innovative teaching and learning approaches. Germany and Taiwan are two additional examples of countries that have included concrete measures and incentives to encourage innovative teaching and learning approaches into their Excellence Initiatives (Salmi, 2017).

International experience suggests a few lessons regarding the promotion of innovative teaching and learning practices. First, some countries, for example, the United Kingdom, have found it convenient to require all PhD candidates to get a teaching certificate before completing their doctorate. This is a first step toward sensitizing future university professors about the importance of good teaching. Along the same lines, a few universities in the United States have begun offering teaching certificates for community college professors.

Second, it is important to offer appropriate incentives that reward teaching excellence on par with outstanding research. Professors must also be allowed the necessary time to work on improving their teaching performance. Finally, early integration of teaching and research is a powerful way of making the educational experience more stimulating and effective. In top U.S. research universities, for instance, "...the co-location of research with education gives rise to large, positive synergies, ensuring that graduates carry with them into industry knowledge of cutting-edge research, techniques, and instrumentation" (Executive Office of the President 2012, 18).

The rapid development of e-learning in general and MOOCs in particular requires targeted policy and technical interventions to help Kenyan higher education institutions make the best possible use of these new opportunities for modernizing their curriculum in an accelerated fashion. First, one of the tasks of the planned OUK could accompany all interested institutions in the systematic exploration of successful e-learning approaches and the dissemination of lessons learned. Second, they could provide a platform for identifying good practices in the recognition of digital certificates for online courses given by prestigious foreign tertiary education institutions and their integration into the degrees offered by the national universities.

The introduction of innovative teaching and learning practices that promote interactive and collaborative learning also implies remodeling the physical infrastructure and environment of universities. From the flipped classroom, where the professor does not teach but essentially guides and facilitates self-learning and peer learning, to studios and open space classrooms designed to support design-based learning in teams, the new learning facilities represent a flexible learning environment that breaks away from the traditional classroom and lecture hall.

Finally, it is important to bear in mind that curricular and pedagogical innovations can transform learning only if the assessment criteria and processes are fully aligned with the educational experience of the students. For instance, traditional end-of-semester exams may not be appropriate any more to evaluate the learning outcomes of students who participated in a problem-based course organized around group work and peer learning.

Therefore, to support students' acquisition of 21st century skills, universities need to implement assessment strategies different from the ranking and classifying practices that are commonly applied. Two innovative practices have emerged in recent years in the design and use of assessment in university settings. The first one is a progressive shift toward a competency-based education

model, in contrast to the traditional content-based model of course design and delivery (Henri, Johnson, and Nepal 2017). The second one, triggered by the increasing reliance on competency-based evaluation, is the move away from high-stakes summative evaluations to a formative assessment model (Gomez-Garibello and Young 2018). Assessments are formative when the information that they generate is used to adapt the instruction process to student needs. Advanced technological tools, such as AI and social learning platforms, allow students to obtain immediate feedback from the formative assessment conducted by the instructor. The main forms of social learning platforms that support the use of formative assessment are student response systems, online student peer-review systems, and online teamwork feedback systems.

3.2.4. Closer Links to Employers

Strengthening links with industry is an effective way of increasing the relevance of higher education programs. The Kenyan universities could use a large variety of mechanisms, including internships for undergraduate students, in-company placements of research students and academics, and practitioners from industry as visiting lecturers. Close consultation between firms and universities is needed so that the latter can react quickly to changing skills needs (Box 12). Incorporating training for entrepreneurship into regular university programs can also help bring them closer to the productive sectors. Finally, universities may consider establishing cooperative learning programs that alternate on-campus learning periods and regular in-firm internships (Box 13).

Box 12. Close Collaboration between Korean Universities and Firms

Yonsei and Korea universities, along with other universities in Korea, are rushing to open new departments in cooperation with Samsung Electronics or SK Hynix to groom future engineers in the field of system semiconductors.

The move comes amid a serious unemployment crisis in tandem with a feared brain drain in the industry. It is also in line with the Korean government's plan to nurture 3,400 professional personnel in the sector through four-year undergraduate programs by the end of 2030, amid a growing need for chipmakers to expand their presence in the nonmemory chip market.

Sungkyunkwan University has already operated a similar course in cooperation with Samsung Electronics since 2006, enjoying great popularity among students and parents. During the 2019 admission period at the university, 1,387 students applied to the department that will select just 55 students.

Seoul National University (SNU) and the Korea Advanced Institute of Science and Technology (KAIST) are also discussing opening their own departments.

Fifty students who major in system chips at the Yonsei University will be hired by Samsung Electronics, while 30 who study at Korea University will be recruited by SK Hynix. The chipmakers will also award scholarships to students of the new departments and cover the operating expenses of the university departments.

Source: The Korea Times (2019)

Box 13. Lessons from Co-operative Programs

Co-operative education is a model that alternates academic studies with relevant work experience in a field directly related to a student's academic or career goals. The advantages of this model are considerable: it allows students to gain relevant work experience, apply theoretical knowledge gained in the classroom, and clarify career plans. It also helps students build contacts with employers and establish networks to facilitate finding employment upon graduation. Working as part of the studies program helps finance education; it is also useful for learning on how to behave on the job and, in general, to develop the skills which employers want. The advantages for employers are also significant because they have "access to well-prepared short-term workers, flexibility to address human resource needs, cost-effective long-term recruitment and retention, partnerships with Schools, and cost-effective productivity" (The National Commission for Cooperative Education, United States of America).²⁶

Waterloo University in Ontario, Canada, is home to the world's largest co-op program—15,800 undergraduate co-op students (more than 56 percent of the full-time undergraduate population at the university and more than twice as many students as the next largest program in the world) and 3,500 partner employers around the world (StudyinCanada.com). A co-op student at Waterloo graduates with the same number of study/academic terms as a non-co-op student, plus up to two years of work experience in different professional areas. The student has four to six work terms (each usually four months long) to try out a variety of careers to find out his/her interests before graduating. On average, by the time the student graduates, he/she has already earned from US\$25,000 to US\$74,000, resulting in smaller student loans than other students and a greater capacity at paying them back. Graduates of Waterloo's co-op programs earn about 15 percent more upon graduation than graduates of non-co-op programs (University of Waterloo).²⁷ Furthermore, Waterloo University offers the Enterprise Co-op program where students obtain support (advice of experienced professionals and in some cases, economic resources) to develop their own business.

Source: The World Association for Cooperative Education (WACE); The National Commission for Cooperative Education; StudyinCanada.com; and University of Waterloo, Canada.

It is often assumed that efforts to bring universities closer to industry apply only to engineering and applied science programs, not to the social sciences and humanities. But in reality, it is more a matter of mindset than academic discipline. A cooperative program could be set up for a history degree, for instance, whereby students would alternate between formal periods of learning at the university and periods of study/research while attached to a museum or a cultural center or a company in the creative industries.

Finally, incorporating training for entrepreneurship into regular university programs can also help bring them closer to the productive sectors, thereby boosting their ability to nurture young entrepreneurs. The first ranking looking at what happens to university graduates from the point of view of their success as young entrepreneurs shows that only one non-OECD country, Israel, appears among the top 50 (Table 20).

²⁶The National Commission for Cooperative Education (NCCE) is dedicated to advancing cooperative education throughout the United States. <http://www.co-op.edu/aboutcoop2.html>.

²⁷ University of Waterloo, Canada. "Co-op at Waterloo". <http://findoutmore.uwaterloo.ca/coop/>.

Table 22. Universities with the Highest Proportion of Successful Young Entrepreneurs

Country/Region	Number of Universities in Top 50
United States	44
Israel	3
Canada	2
Ireland	1

Source: Pitchbook 2018.

https://files.pitchbook.com/website/files/pdf/PitchBook_Universities_2018_2019_Edition.pdf.

A recent report prepared by the European University Association (EUA) explains that the key factors to promote entrepreneurship at university are collaboration, knowledge sharing and allowing students to show initiative (Reichert 2019). “It is about interdisciplinarity in the classroom, project-based learning, team work, and developing soft skills. But it is also outside the classroom, allowing students to develop student-led activities” (King 2019). Besides the well-known examples of universities that have traditionally been successful in developing entrepreneurship mindsets and skills among its students, such as MIT or Stanford University, a number of young institutions have also distinguished themselves in recent years, among them Olin College of Engineering in the United States, KU Leuven in Belgium, Aalto University in Finland, TalTech in Estonia, and Haifa Institute of Technology in Israel.

Finally, it is worth underlining that entrepreneurship is not only about launching successful firms in the economy, but also about social innovation and leadership, as illustrated by Box 14.

Box 14. The Power of Social Entrepreneurship

Despite reforms to outdated curricula taking place in many countries across Africa, the continent's youth still get too few chances to learn the type of 21st century skills that will secure them employment or enable them to build up businesses for themselves, according to Bruhan Kyomuhendo. A student leader at Kyambogo University in Kampala, Uganda's capital, believes passionately in the power of entrepreneurialism to drive Africa's development forward.

Kyomuhendo grew up in a large subsistence farming family in a village in Kyenjojo District in western Uganda. He is driven by an ethical belief in giving back to his community, inculcated during his high school years when he was supported by a MasterCard Foundation scholarship on a BRAC Uganda scholars programme. The scholarship package included tuition and a workshop "where dedication to community service was instilled in us" and has been instrumental in encouraging scholars to become change makers. "We underwent leadership training and they brought leaders in from various fields in entrepreneurship, art, education and health and motivational speakers as well," Kyomuhendo says. "Through those trainings they taught us to be transformative leaders who will impact on Africa and be good examples to the next generations."

"Transformative leaders work with passion to achieve positive change in their communities," says Kyomuhendo. "But what we have here is lots of people who have good ideas that would see many youths employed through their implementation, but they can't implement them."

Kyomuhendo is full of ideas himself, so much so that he is now writing a book and trying to find a publisher. The working title is "What you are not told when joining school or university." "I realized that there are many people who get into school or onto campus without having any idea of their route out of there," he explains. "For instance, they don't know they can do an internship before going to university. Or they don't know how valuable mentorship can be, that with the right mentor you can avoid making a lot of mistakes at university or in your life."

Source: O'Malley 2019.

3.2.5. Increased Internationalization

Internationalization is not a luxury reserved for industrial countries, elite universities, or rich students. It is not just one option among many paths open to tertiary education institutions in developing countries. In a world that is becoming every day more interconnected and interdependent, internationalization is one of the key instruments to improve quality and relevance and prepare graduates capable of working as global professionals and living as global citizens.

Internationalization means, among other things, effectively equipping graduates with the wide range of knowledge, skills, and competences required in the global economy; conducting internationally competitive research; and attracting international students and professors. Internationalization of higher education is more than just signing collaborative agreements with foreign institutions and exchanging students and academics. It involves embedding the international dimension in all aspects of teaching and research, at both the national and institutional levels.

To improve the internationalization dimension, the Kenyan higher education institutions need to place more emphasis on preparing globally minded, locally responsible, and internationally competitive students. This means accelerating the international mobility of students, professors, and researchers. It also requires raising foreign language competencies among academic staff and graduates. Additional resources should be made available to support all these initiatives. Box 15 illustrates what a comprehensive internationalization policy could entail, including consideration of 'internationalization at home' elements to reduce the costs of mobility and diminish the risks of brain drain.

Box 15. More Action Not Just Talk, on Internationalization

For much of higher education, internationalization is undergoing a paradigm shift in scale and scope, rather than a fundamental shift in the basic concept. The activity of higher education is increasingly crossing borders with the flow of ideas, students, scholars, and partnerships—both instructional and research. Preparing graduates for a global labor market and economy and helping communities and businesses negotiate a global landscape has increased saliency. Internationalization is not an end, but rather a means to meet these challenges and opportunities.

Comprehensive internationalization is commitment and action to integrate international, global, and comparative content and perspective throughout the teaching, research, and service missions of tertiary education to achieve core learning and discovery outcomes. Although there are regional differences, all appear to share aspects of certain tenets: providing access to international content and perspective to all students, not just a minority; student mobility as a component of internationalization, not a synonym for it; moving internationalization beyond teaching and learning to include research and service missions; and expanding the number of faculty and staff members engaged in international efforts.

Treating internationalization as yet another ‘add on’ responsibility can neither be afforded, nor prevent its eventual marginalization in the competition for scarce resources. Sustainability requires its integration into the core missions and involves the campus widely. Lou Anna Simon, President of Michigan State University, champions a reaffirmation of traditional land-grant and public university values of “quality, inclusiveness, and connectivity” for a global environment—or what she refers to as a transition from land-grant to world-grant in orientation and commitment—and integration of the local and the global.

Institutional culture. Comprehensive internationalization needs a culture that defines institutional missions and values in global terms—not just in local or national terms. What is needed is a broadly shared culture throughout the institution of a commitment to internationalization and its outcomes.

Contributors. While humanities, languages, and social and behavioral sciences remain core elements in international education, professional disciplines take on renewed importance. Problems and opportunities in, for example, public health, environment, food supply, and economies now easily jump boundaries. All disciplines and professions are better informed by global perspective, shaped by it, and capable of contributing globally.

Leadership for action. Clear and frequent messaging from the leadership is important. The role of academic deans is critical for prompting action in academic programs. Faculty intellectual leadership and commitment is essential for progress. As not everything can be done at once, an important role of leadership is to set priorities for action and hold accountable those who should be contributing.

Define and reward what counts. What is counted counts. Integration of international dimensions into curricula signals what counts for students. Including international accomplishments into promotion, compensation, and tenure criteria signals what counts for faculty. The allocation of resources to internationalization signals institutional commitment.

Recruit and employ for internationalization. Institutional capacity is enhanced by recruiting students who have an interest in international learning and by hiring administrators, faculty, and staff members with international backgrounds, experience, or interests.

Source: Hudzik (2011).

3.2.6. Strengthened Research Capacity

Talent Development

The most important element in any university’s strategy to strengthen its research capacity is its ability to attract and retain top-rate academics—young promising researchers and experienced proven researchers—who can contribute to building critical mass of excellence in research and knowledge transfer. While strong research groups can be found in a number of Kenyan universities, those with the potential to become more research intensive need to have a clear capacity-building program in place and provide adequate incentives to encourage and reward high-impact research. These incentives, which would signal a cultural shift in favor of research, could

include financial rewards for good research performance, flexible schedule arrangements that would allow productive researchers to have a reduced teaching load, especially those linked to Centers of Excellence, and opportunities for academic mobility and participation in international research networks.

To improve gender equity and thus avoid talent loss, the university leadership teams ought to put in place special programs to attract more qualified female academics into research, combining financial and nonmonetary measures to remove existing obstacles.

Strengthening of Links with the Economy and the Regions

The leading Kenyan universities must strengthen their research and development activities to build their capacity to engage with the local economy and support the national and regional innovation system. They can play a critical role as one of the key pillars of the country's innovation strategy. Indeed, the presence of strong universities is important to regional development, through both direct links and spillover effects. The successful experiences of technology-intensive poles such as Silicon Valley in California; Bangalore in Karnataka State, India; Shanghai in China; and Campinas in São Paulo State, Brazil, attest to the positive effects that the clustering of advanced human capital alongside leading technology firms can have. Box 16 contrasts the different experiences of Oxford and Cambridge in the development of links between the university and the local economy.

Box 16. Creating Dynamic Clusters: The Cambridge Model

The top two British universities, Oxford and Cambridge, are more than 800 years old. They share a similar history and stem from the same academic culture. They are both considered among the best universities in the world. And yet, when it comes to the impact on their respective city, Oxford and Cambridge have followed divergent paths and achieved strikingly different results. Oxford remains an old-fashioned university city, whereas Cambridge has become the “most exciting technology cluster in Europe.” What began in the 1970s with the creation of business parks to welcome entrepreneurial academics and their doctoral students has evolved into a hub of 4,000 knowledge-intensive firms in electronics, pharmaceuticals, biotechnology, and other frontier domains. It is today the most dynamic place in Europe where professors, Nobel Prize scientists, and angel investors plot their next start-up.

With a productivity level 30 percent higher than London's, Cambridge generates more patents than its next six British rivals taken together, it hosts more billion-dollar firms than cities 10 times bigger, and it boasts near full employment.

The secret to Cambridge's success seems to lie in a balanced approach combining enlightened policies to provide the right infrastructure and economic environment and a laissez-faire attitude that trusts human ingenuity and serendipity. On the one hand, the university, the city council, and the neighboring authorities have worked in a coordinated way to create a favorable ecosystem by setting up science parks and incubators, encouraging the development of business and housing estates, attracting investors, and lobbying the government for more open immigration policies. On the other hand, they have kept away from imposing strategic priorities and micromanaging the city's economic development. The city does not decide what type of high-tech industry is more likely to become tomorrow's industry, and the university gives incentives to academics interested in setting up companies, making the membrane between its laboratories and private firms as porous as possible. This has resulted in dynamic partnerships where firms provide advice free of charge and invite students to help them, while academics and angel investors work together to chaperon new companies.

Unlike many universities in the United Kingdom that still work in silos, Cambridge University has been particularly good at stimulating collaboration across academic disciplines. As explained by Jeremy Sanders, one of Cambridge University's pro vice-chancellors, the university's philosophy is to “hire people smarter than you, give them as much freedom and research funding as possible, stand back, and reap the harvest ten years later.”

Source: The Economist 2015.

In addition to contributing to the local economy through salaries and the purchase of goods and services, universities can be essential economic agents through relevant applied research and the training of highly qualified professionals who can help make the local firms more innovative and productive. The universities can fulfill this role in several ways, not only by participating in new innovations but perhaps even more importantly by facilitating technology upgrade and absorption.

By setting up their own incubators or linking up closely with the industrial parks under development, the strongest Kenyan universities could contribute innovative ways of producing goods and services. This would require systematic efforts to undertake industry-oriented research and seek opportunities for technology commercializing.

Conducting research that results in patents and licenses that allow firms to make new products and develop new lines of business is important, but it is not the only manner in which technology transfer can take place. Firm-strengthening ideas pass between the academic world and companies through other forms of collaboration. The contribution of Kenyan universities to technology upgrade and absorption can best be achieved in two ways. First, involving employers in curriculum design and having them take on students as interns strongly increase the probability that firms will employ qualified graduates. These graduates, in turn, will be agents of technology transfer, bringing new techniques and know-how to firms, especially small and middle ones. At the end of the day, the best conduit for moving ideas back and forth between universities and firms is through the students and graduates themselves.

Second, by opening their doors to firm representatives and organizing technology information and diffusion events, the universities can act as knowledge exchange platforms which, despite the often-informal character of interaction between academics and industry people, can have a significant technology transfer influence on industry and services.

In supporting the transformation of the existing economic sectors and the creation of new ones, the contribution of universities can take several forms. Table 21 provides a summary description of the principal modalities of collaboration on knowledge transfer and technology commercialization that Kenyan universities could consider developing. It also indicates what role the national and local authorities must play to facilitate these collaborations.

Table 23. Most Effective Knowledge and Technology Transfer Mechanisms

University-Industry Links	Role of National and/or Local Authorities	Comments
Public space function for networking and dissemination	<ul style="list-style-type: none"> • Develop and fund programs to create and support clusters 	With education and training, this function is seen by firms as the most important contribution of universities
Human capital formation (students and firm employees)	<ul style="list-style-type: none"> • Priority setting and incentives for establishment of new programs • Targeted scholarships • Funding and tax incentives to facilitate insertion of PhD graduates 	Primary role of universities in support of innovation
Research	<ul style="list-style-type: none"> • Matching grants and tax incentives • Criteria for evaluating the performance of researchers 	Increased returns at the intersection of traditional disciplines
Problem solving and consulting	<ul style="list-style-type: none"> • Support for cluster formation • Targeted assistance to SMEs 	
Sharing of technical infrastructure	<ul style="list-style-type: none"> • Funding 	Need for clear revenue-sharing arrangements within universities
Knowledge commercialization	<ul style="list-style-type: none"> • Appropriate IPR legal framework • Technical assistance • Financial autonomy of public universities 	More likely to happen in biotechnology, nanotechnology, new materials, and IT

Source: Elaborated by Jamil Salmi.

Note: SMEs = Small and medium enterprises; IPR = Intellectual property rights.

Finally, entering strategic partnerships can help accelerate capacity-building efforts to strengthen the research and technology transfer of Kenyan universities. As many universities in the world tend to do, the leading Kenyan universities have a long tradition of signing Memoranda of Understanding (MOUs) with universities in other countries. Very often, the MOUs focus on academic and student mobility. To ensure that international collaboration serves to fully support their efforts to build up the research output and improve the quality and impact of that research, the Kenyan universities could enter into a small number of long-term strategic partnerships aligned with their key development priorities. Strategic partnerships are deep relationships with carefully chosen institutions that are not necessarily at the same level of development but share a common vision and similar values. The principal objective is to undertake common activities in research and knowledge transfer that are mutually beneficial. From the Kenyan universities' viewpoint, these partnerships should have an institutional strengthening dimension through the development of joint academic programs and/or double degrees, joint supervision of graduate students, collaborative research projects, joint services to the community, and possibly joint benchmarking exercises that could help the Kenyan universities in the definition of stretch goals.

3.3 Strengthening the National QA System

3.3.1 Present QA System

Several government agencies play a role in the Kenyan QA system for higher education. The main department is CUE, which has the core mandate for QA in both public and private universities. Until 2012, CUE was responsible only for enforcing quality standards in private universities. But the Universities Act of 2012 has fundamentally altered how public universities are supervised. Under the new Act all public and private institutions are subject to the same form of government regulation. CUE is now responsible for carrying out QA for the university sector as a whole.

Universities with charters have met CUE's standards for a fully functioning university. Private universities operating with Letters of Interim Authority (LIAs) from CUE continue to receive guidance and direction to continue developing resources and facilities toward full university accreditation (Award of Charter). Institutions operating under LIAs are allowed to admit students to approved programs. Registered private universities are a special category, which predate the establishment of CUE, and the earlier body it has replaced, the Commission for Higher Education. These institutions are still pending the award of a charter (World Bank 2016).

The second major QA body is the Technical and Vocational Education and Training Authority (TVETA), established in 2013. It has the responsibility of harmonizing, organizing, accrediting, and registering institutions in the TVET subsector. The TVET 2013 Act also foresees the establishment of a new body entitled the Technical and Vocational Education and Training Curriculum Development, Assessment, and Certification Council.

In addition to these two bodies, the National Commission for Science, Technology, and Innovation (NACOSTI) is responsible for regulating and ensuring QA in the science, technology, and innovation sector. While this commission has not been fully operational, its official mandate sets the stage for overlapping areas of authority with CUE.

The last relevant agency is the Kenya Qualifications Authority, which was created in 2014 with the primary mission of developing a National Qualifications Framework for Kenya. This work, which consists of assessing the competencies that should be achieved by the students enrolled in existing programs and ensuring improved skills acquisition through the delivery of good-quality TVET and university programs, has been progressing slowly since the establishment of the Kenya Qualifications Authority.

3.3.2 Guiding Principles for a Sound QA System

Looking ahead, the Kenyan government's efforts to further consolidate its QA system could be guided by the following seven principles proposed by the CHEA International Quality Group (CHEA International Quality Council 2015):

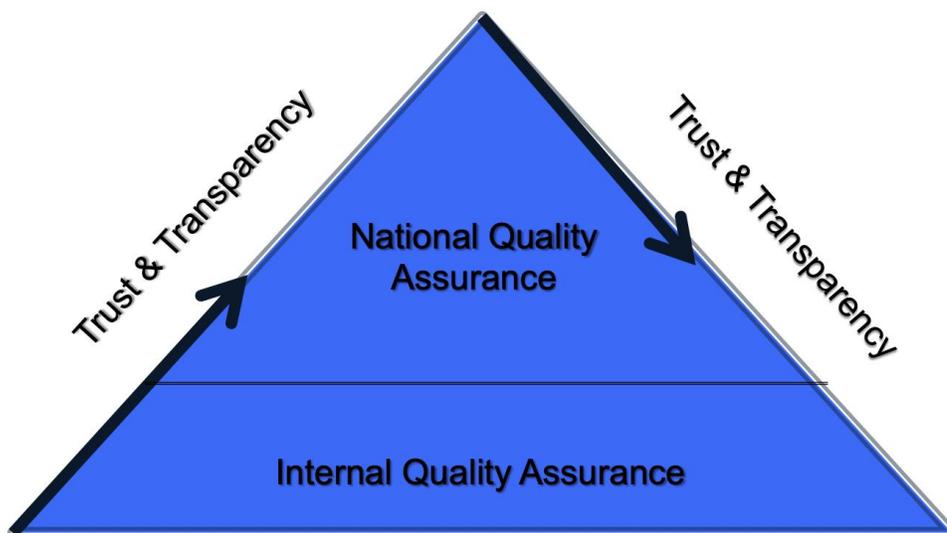
8. **Quality and higher education providers.** Assuring and achieving quality in higher education is the primary responsibility of higher education providers and their staff.
9. **Quality and students.** The education provided to students must always be of high quality whatever the learning outcomes pursued.

10. **Quality and society.** The quality of higher education provision is judged by how well it meets the needs of the society, engenders public confidence, and sustains public trust.
11. **Quality and government.** Governments have a role in encouraging and supporting quality higher education.
12. **Quality and accountability.** It is the responsibility of higher education providers and QA and accreditation bodies to sustain a strong commitment to accountability and provide regular evidence of quality.
13. **Quality and the role of QA and accreditation bodies.** QA and accreditation bodies, working with higher education providers and their leadership, staff, and students, are responsible for the implementation of processes, tools, benchmarks, and measures of learning outcomes that help create a shared understanding of quality.
14. **Quality and change.** Quality higher education needs to be flexible, creative, and innovative, developing and evolving to meet students’ needs, to justify the confidence of society and to maintain diversity.

3.3.3 Options for Strengthening Kenya’s QA Model

The Kenyan authorities are fully aligned with these principles, especially the first one mentioned above, as they recognize the importance of combining efforts at the national and institutional levels: “the Commission recognizes that quality and quality control are primarily the responsibility of higher education institutions themselves but they partner with the Commission for better results.”²⁸ Figure 11 illustrates this complementarity, which can operate successfully only if the relationship between the state and higher education institutions is based on trust and transparency.

Figure 11. Features of an Aligned QA System



Source: Elaborated by Jamil Salmi.

²⁸ <http://www.cue.or.ke/index.php/faqs>.

National QA System

The past eight years have seen a lot of progress in building the national QA system and enforcing educational standards. In 2011, 100 illegal institutions were closed down because of poor quality and, sometimes, fraudulent practices. By 2014, all nonaccredited universities had ceased to operate. Furthermore, Kenya has done what few countries had the courage to do: close part of a public university, Kisii University, because of the low quality of the programs delivered in 10 out of the 13 campuses.

In 2017, the Ministry of Education and CUE conducted an in-depth audit of all universities. Even though the findings have not been made public, it has been rumored that some universities have been recommended for closure because of major concerns related to substantial understaffing. It would appear that only 35 percent of the university academic staff currently employed are qualified to teach according to the guidelines set by CUE.

Notwithstanding this progress in applying official standards, many of the points mentioned by the 2016 World Bank report with regard to the challenges faced by Kenya as it seeks to build an effective QA system are still valid today.

QA systems need to appropriately cohere and balance the imperatives of preexisting institutions (higher education governance and market structures), QA mechanisms (accreditation, assessment, and audit), incentive structures (required or not, financing mechanisms, disclosure procedures, etc.), and the objectives of the overarching QA system (accountability vs. improvement) in order to function effectively. An additional critical component for ensuring effective QA is an assessment of institutional capacity to enforce. Independent results-based financing systems can play an important role in incentivizing QA compliance. Kenya is in the process of implementing important reforms to QA and financing systems with the potential to significantly improve the balance between accountability and improvements in QA. A critical challenge in this regard will be to ensure that these reforms are effectively implemented and that they keep pace with the rapid expansion of the postsecondary system (World Bank 2016, 25).

The issue of professional independence is one that needs to be addressed. CUE, as the Ministry of Education's main arm for overseeing the university sector, has many important roles. It is expected to make policies, plan, monitor the performance of the university sector, regulate public and private universities, and communicate government policies to stakeholders, regarding university education in Kenya. In the spirit of independence that characterizes well-performing QA systems, it would be advisable to separate the evaluation and accreditation functions of CUE from its other policy-making, planning, and regulatory functions. Establishing a stand-alone accreditation body might be the best way of achieving this goal as this would keep the policy-making and QA roles properly separate.

Institutional capacity is a second issue that merits careful consideration. Whatever configuration the Kenyan government opts to implement, one of the main challenges will be to provide the resources and professional capacity to undertake all the tasks involved in QA compliance and enhancement in an efficient and effective manner. Furthermore, if CUE is to fulfill its entire mandate as envisaged by the 2012 Act, it will need to move beyond institutional accreditation and also accredit all programs at universities. This is a daunting task. The University of Nairobi alone

has 371 programs, and this is not a once-in-a-lifetime activity. Accredited programs will need to be reaccredited after some defined time, especially in the STEM areas. It is therefore indispensable to substantially strengthen the capacity of CUE to carry out the program accreditation at a reasonable pace.

In parallel, the Kenyan government should consolidate existing QA mechanisms and align their delivery capacity with the rhythm of creation of new institutions and programs. It may also consider the option of delegating the accreditation responsibility for specific programs to independent professional associations and organizations, following the model in place in Mexico and the United States. In this approach, the main role of the national QA agency would be to accredit the professional accreditation bodies, following the example of the Council of Higher Education Accreditation (CHEA) in the United States and the Council for Accreditation in Higher Education (*Consejo para la Acreditación de la Educación Superior*, COPAES) in Mexico, whose main function is to accredit the accrediting agencies. This is already happening in a way in Kenya. At present, some programs such as engineering, law, and pharmacy, must be accredited by the relevant professional bodies before CUE can approve them. But rather than having a two-step procedure that involves some degree of duplication and lengthens the process, CUE could just delegate entirely to these professional bodies the responsibility for evaluating and accrediting all programs in their professional ambit.

Internal QA

In addition to strengthening the official QA mechanisms, the Kenyan government should also consider offering incentives for the establishment and/or consolidation of internal QA units in all higher education institutions, which are essential for the development of a genuine and effective QA culture. An appropriate internal QA system includes the following aspects:

- Information provided to students on the institution's study programs (for example, number of students and staff involved in a program, staff to student ratio, intended learning outcomes, qualifications to be granted, teaching/learning/assessment methods, external learning opportunities such as internships, employment prospects, and accessibility and support for students with disabilities).
- A good management and information system that collects information about student profile (for example, age, gender, and educational and socioeconomic background) and tracer studies.
- Evaluation procedures to cover, at the minimum, the quality of teaching and learning, including the learning resources (for example, libraries, computing facilities, laboratories, and workshops) and the student support services.
- Structures to support such procedures, including a senior academic in charge of oversight (for example, academic deputy vice chancellor) who chairs a university committee, a centralized QA unit and QA officers in faculties, plus a unit responsible for supporting academic staff development (teaching and learning services).
- Processes to ensure wide ownership and engagement in QA processes through formal participation in advisory bodies of academic and administrative staff, university and faculty

leadership, students, external stakeholders, and alumni. This should include formal and informal communication about the results of the internal QA processes so that everyone understands their value. Bringing together diverse, sometimes conflicting, interests requires cooperative and participative approaches that serve as a basis for effective negotiation processes on all institutional levels. Likewise, internal QA benefits from being based on a broad consensus that secures the acceptance of decisions and promotes their implementation.

- Processes to ensure links with strategic management and planning through the use of key performance indicators and to ensure that the university and faculty leadership are informed regularly of the results of the evaluations and required to provide a response.
- A systematic process for designing new study programs and improving the established ones, often with the help of external stakeholders to ensure relevance. As much as possible, such procedures should include the development of learning outcomes and their assessment.
- Transparency is indispensable at all levels. The design of internal QA structures and processes must be clear to all stakeholders involved. The respective roles of all units and actors should be well defined and evident. A culture of transparency implies that processes at all stages follow an adequate level of openness.

Labor Market Considerations

The labor market results of higher education institutions are an important dimension that QA must consider. This is possible only if the country has a well-built and reliable labor market information system. The last section of this chapter reviews the labor market information aspects.

3.4 Developing a Comprehensive Labor Market Information System²⁹

The Government of Kenya should put in place, as a matter of priority, an LMO tasked with collecting and analyzing the employment results of all graduates. This would provide prospective students, university leaders, and employers with relevant information about labor market trends, employment characteristics of graduates, and changes in occupations. In putting in place such an observatory, Kenya would follow the example of the many OECD countries that have employment observatories at the supranational level (EU employment observatory); the national level (for example, Bureau of Labor Statistics in the USA, Destination of Leavers from Higher Education survey in the United Kingdom, and survey of university-based AlmaLaurea observatory in Italy);

²⁹ Information for this section comes from the following documents and sites:

World Bank. 2018. *Revitalizing the Botswana Labor Market Observatory*. Washington, DC: World Bank.

Australia: <http://lmip.gov.au/default.aspx?LMIP> and <http://www.graduatecareers.com.au/> (for graduate careers).

Chile: www.mifuturo.cl/ (in Spanish).

Colombia: www.graduadoscolombia.edu.co (in Spanish).

Germany: <http://www.iab.de/en/daten/arbeitsmarktentwicklung.aspx> and

<http://www.pub.arbeitsagentur.de/hst/services/statistik/000200/html/webapp/betaArbInteraktiv/Main.html>.

Malaysia: wageindex.mohr.gov.my/index.php/en/.

South Africa: <http://www.labour.gov.za/DOL/downloads/documents/annual-reports/labour-market-bulletin-report/2016/almb2016.pdf> and <http://www.labour.gov.za/DOL/documents/annual-reports/annual-reports>.

and the subnational level (for example, Learning and Skills observatory in Wales, OREF - regional observatories of jobs and training - in France, and Education-Employment Information system in Florida). In this context, this section analyzes examples from the OECD and developing countries that have set up an effective LMO; shares lessons of experience arising from these case studies; and underlines the importance of coordination at the national, regional, and local levels.

3.4.1 International Examples

OECD Countries

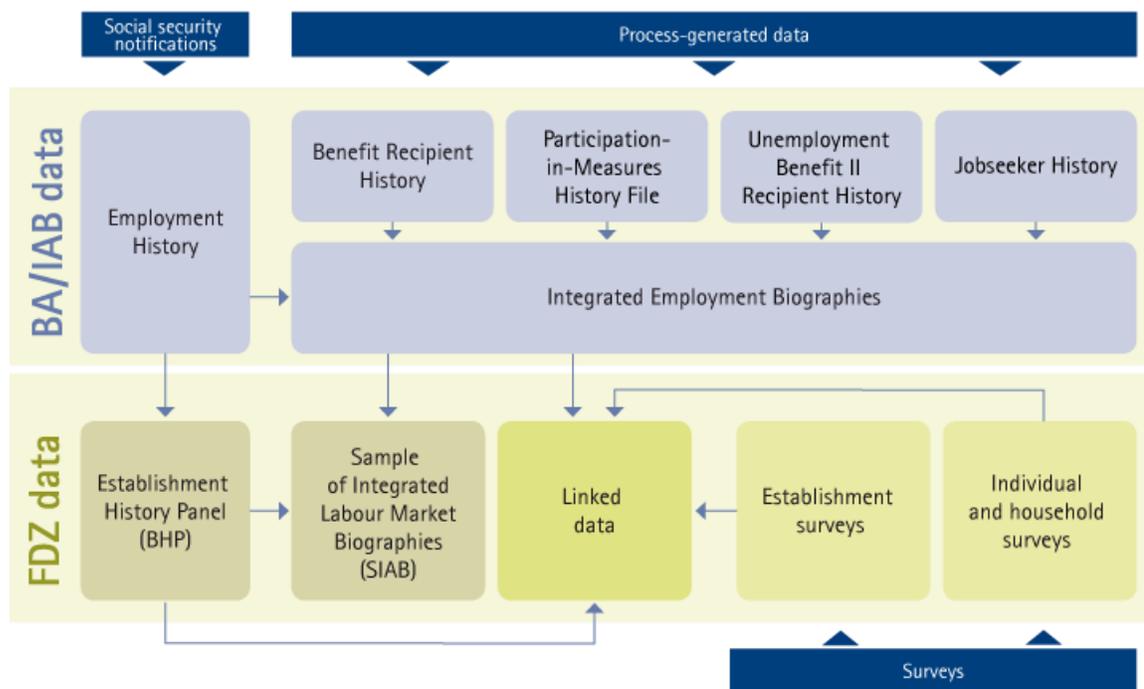
Germany. The German LMO combines several databases. The Employment Research Institute of the German Federal Employment Agency (*Bundesagentur für Arbeit*, BA) provides micro data based on administrative data (social security and employment). There are many types of data that provide a detailed longitudinal history of income and employment. However, there is no information on periods of self-employment or public service and so on.

The Research Data Center (*Forschungsdatenzentrum*, FDZ) provides data on individuals, households, and institutions, as well as data including both settlement information and personal information. FDZ data come from three different sources: (a) notification process of the social security system, (b) internal procedures of FDZ, and (c) direct surveys.

In addition, the Ministry of Education contracts a university to carry out an annual survey of graduates (*Kooperationsprojekt Absolventenstudien*, KOAB). The KOAB project is an annual survey of graduates from around 80 higher education institutions in Germany and Austria, following up on about 70,000 people. This survey is conducted approximately 18 months after graduation and again 4–5 years after graduation.

Figure 12 shows the LMO architecture in Germany.

Figure 12. Labor Market Information System in Germany



Note: https://fdz.iab.de/UserFiles/Image/test/Datenwege_en.png

Italy. AlmaLaurea provides the largest Italian database of graduates resumés (900,000 from 50 universities) and now gathers 67 percent of all Italian graduates' profiles. AlmaLaurea was created in 1994; is currently managed by a consortium of Italian universities; and is supported by the Ministry of Education, Universities, and Research. The services offered to graduates and students include the following: online posting of graduate resumé, advice to improve resumé and option to update it regularly, access to a large bank of job offers and enterprises, and option to answer job offers online through the AlmaLaurea website. Postgraduate programs are also described to better match students' needs for further education; alerts are sent via emails to keep the user on track and facilitate his or her proceedings.

The incentives for universities to subscribe to AlmaLaurea are significant: provide more options to their students, think about new curricula and orientation, and develop internships/first job options. AlmaLaurea also provides annual information on the occupational conditions of graduates, including PhDs, gathers archives of graduate and doctorate thesis titles, validates the administrative records of graduates, and helps promote postgraduate and master's courses through the website. Employers, on their part, have online access to the largest Italian database of graduates' resumés and can easily purchase curriculum vitae, select the best candidates through criteria matching, announce new job offers, and describe their company to attract the best graduates.

United Kingdom. The LMO in the United Kingdom builds upon many surveys and data sources:

- Statistical information on the employment outcomes is built by combining data from census and sample surveys. Most information is from the Labour Force Survey (LFS), which assesses employment conditions of the labor force. It is the largest household survey

in the United Kingdom and provides the official measures of employment and unemployment. Estimates on unemployment are also available at former Government Office Regions (GORs) and at the local area level. Regional estimates of total unemployment are measured by the LFS while more disaggregated regional unemployment estimates, and local area estimates are measured by the Annual Population Survey (APS). There are also the Workforce Jobs (WFJ) surveys that are run quarterly by industry, region, gender, and full-/part-time jobs (Workforce Jobs 2013). The sample size is approximately 32,800 businesses, 1,500 contributors, and 50,000 household responses. They are all interviewed for five successive waves at three-monthly intervals.

- Tracking of graduates is undertaken by each institution and at the national level at the Higher Education Careers Service Unit (HECSU), which is an independent research charity specializing in higher education and graduate employment. The HECSU conducts a web-based graduate survey to all graduates through a standard questionnaire with a completion rate of 75 percent.
- Higher education institutions are obliged by law to provide data and information of their graduates six months after graduation, using a simple form. This provides a comprehensive central database on graduates by qualification level, discipline, and institution, among other variables.
- The Migration Advisory Committee (MAC) is developing a tracking process of the graduates and the workforce. The MAC uses a two-pronged strategy: a top-down methodology by integrating national-level data sets and a bottom-up methodology where individual job indicators from specialized surveys are used.
- The quantitative information is combined with qualitative data collected through sample surveys or interviews in focus groups.
- In validating the data, the MAC dovetails top-down and bottom-up data. Therefore, those consultants, research centers, and academic staff are involved in this process of the data analysis. The LFS is designed to be comparable over its whole duration, and this, together with the accuracy of its industrial information, are the strengths; however, the MAC is not able to combine education surveys and LFS data.
- A full review of the entire data, including all surveys, takes place every two years.

Developing and Transition Nations

Bulgaria. Since 2012, the Bulgarian government has published detailed data on the labor market results of university graduates. Using data from the Registry of Tertiary Students and statistics from the National Social Security administration, the Ministry of Education is able to provide a wealth of information on the types of jobs and levels of remuneration of graduates who left university in the previous five years. The database indicates, for instance, whether the graduates found a job, whether their position corresponds to their field and level of study, what type of employers they are working with, whether the graduates have a permanent or temporary job, and the level of salary estimated on the basis of social security contributions.

Chile. Supported by the Ministry of Education and jointly run by the School of Government of the private University Adolfo Ibanez and the University of Chile's Department of Industrial Engineering, *Futuro Laboral* aims to equip youths and students with academic orientation tools. It provides information on the occupational situation of graduates of hundreds of professional and technical careers that represent 75 percent of technical and professional graduates. The information available to the public includes detailed data on salaries and employment opportunities. The portal displays, for each program of every tertiary education institution, detailed information on dropout rates, average time to degree, average earnings of the graduates after four years of graduation, current tuition fees for the program, and accreditation status of the program. Employment and earnings data are not self-reported but gathered from the database of the national tax revenue authority. Earnings are matched to the databases of graduates provided by the tertiary education institutions. The privacy of the information is maintained, as the tax service issues only the average values for each program in each institution, provided there are at least 25 individuals in each program/institution's cohort for whom earnings data are available.

Colombia. *Graduados Colombia* (Regional Observatory of Jobs for Education) was launched in 2005 and is managed by the Ministry of Education. It collects and presents information on the demand and supply of graduates. Students, families, tertiary education institutions, researchers, and the productive sector have access to statistics on the academic level of the graduates of technical institutes and universities, the salaries they receive, the average time for finding the first job, as well as the cities where they work. The website serves as a tool for students trying to choose a career, and it is also useful for tertiary education institutions intent on renewing and adapting the programs they offer according to labor market needs. *Graduados Colombia's* site provides links to job offers in Colombia and in other countries as well as advice and tips on how to write and present a good resumé. Visitors are able to look for the results of the graduate and employer surveys, as well as studies on specific disciplines and economic sectors.

Malaysia. The Institute of Labor Market Information and Analysis (ILMIA) provides up-to-date labor market information. The procedure is as follows: all agencies (public and private) collect data through surveys. This information is delivered to the Labor Market Data Warehouse and only the latter analyzes the information and presents the results in the job portal/dashboard of the ILMIA.

- The ILMIA can provide labor market indicators to all actors involved: employees, employers, education institutions, temp bureaus, and local and foreign investors for them to better position themselves within the labor market. The job portal of the ILMIA dashboard provides up-to date information. It is continuously updated with the latest information.
- The ILMIA has several ongoing studies and research as part of its work using surveys as an instrument to collect data, such as National Labor Cost Survey, Environmental Scan, Critical Skills Committee, and Develop Wage Index, among others.
- The Labor Market Information Data Warehouse (LMIDW) centralizes the storage and access for all relevant data, and this helps minimize the statistical information gaps, standardize concepts, and provide in-depth data analysis and its diffusion. This project first began in 2013 and is currently in Phase IV. The current phase aims at data sharing with

other government partners such as the Ministry of Human Resources and other government agencies that collect labor market-related information. The goal is to incorporate the analysis of administrative data in the LMO to complement the existing survey-based information.

- Data integration has been one of the main challenges so far. This occurs because the data originate from different providers (public and private agencies) with each entity having a specialized survey and database to fulfil their needs.

South Africa. The country has two main sources of data on education and labor market outcomes: administrative data collected by research units embedded in government departments and survey data collected by the national statistics bureau. The administrative data primarily cover education outcomes (for example, enrollment, institutions, and performance) while the survey data cover a broader range of both educational and labor market topics collected at the individual level, although the focus of the surveys is the labor market. It is not possible to integrate the labor market survey data with the administrative data, which is the main weakness of the information system. The labor market survey data allow researchers to link education level and enrollment to labor market outcomes; however, data about educational performance remain part of the administrative data, making it difficult to analyze the effect of grade performance on labor market outcomes in South Africa.

3.4.2. Lessons of Experience

All the initiatives presented in the previous section are relevant examples of labor market observatories aimed at better understanding the employment outcomes of graduates, their career aspirations, and career trends. As such, they help address one of the major challenges of higher education: its relevance to individuals and societies. The following lessons can be drawn from the review of international experiences:

- Reliable data are the starting point for any LMO. The data must be credible, continuous, comprehensive, and appropriate.
- Most LMOs use several data sources, which are a combination of administrative databases and surveys. The starting point for data collection is having a well-functioning national statistical office. Most advanced economies have such a statistical agency that performs several standard functions. The first of these is to regularly undertake a series of surveys to collect applicable data. These can range from a census to individual-level labor market surveys. The LMOs also typically rely on data drawn from other sources such as administrative data. This is the case for indicators on institution-specific labor market outcomes.
- It is useful to have an effective partnership between the agency responsible for the LMO and the national statistical office. Regular surveys of the population are a tool by which the LMO and other government departments can monitor and evaluate whether policy goals are being reached or not. Only if consultation between these two stakeholders occurs during survey design will the relevant survey questions be asked and the LMO provide the useful information.

- The audience for LMOs is multiple: policy makers, students, higher education institutions, employers, NGOs, and the research community as users of LMOs. Sometimes, through specific student-oriented web portals, both labor market information and higher education information are presented to facilitate and inform the choice of careers, programs, and institutions.
- Detailed information allowing for institutional-level indicators is critical for actions by each higher education institution. Large-scale household surveys are based on short education modules as part of the household questionnaires and therefore provide limited information for an education observatory. Further, some surveys examine only the relationships between the discipline of study, types of higher education institutions, gender, employment status, and the economic sector. This leaves a margin for interpretation and provides only general information, which is useful but does not lend itself to specific actions at the institutional level. Each education institution and the funder (government or family) are keenly interested in labor market outcomes of graduates from specific institutions to make decisions and/or evaluate institutional performance.
- National coverage is critical. Many questionnaires are directed to graduates from a single university or to graduates of a specific area or graduates from only a few universities. This does not help obtain a representative and comparable national and institutional picture. A common approach across institutions is preferable. High-income countries tend to rely predominantly upon survey data for the LMO, while middle-income ones rely predominantly upon administrative data supplemented with specific surveys, most notably specialized graduate surveys. High-income countries have multiple surveys, which also feed into the LMO.
- A long-term perspective of the LMO is desirable. Many surveys are carried out quickly and provide an incomplete picture of the labor market insertion of university graduates because they are either in transition or have barely started their professional career.
- The LMOs should have their own websites that explain the information to the public in an easily accessible and transparent manner, being candid about the strengths and limitations of the data. Sometimes surveys and observatories are superficial in establishing links between higher education and the labor market. They do not provide an adequate explanation of the contribution and impact attributable to the education institution or the study conditions at institutions.
- The development of an LMO is an iterative process. It takes time to build a comprehensive LMO given the number of databases that need to be merged and the surveys that must be analyzed.
- The LMO often starts at the higher education level and is then expanded to cover graduates of the TVET system as well.

To assess which international experiences are more relevant to the needs of the Kenyan higher education system, it will be important to take the following criteria into consideration:

- **Coverage of the LMO.** What is the share of graduates reporting to the LMO or formal/informal economy? What is the share of national/nonnational graduates? Do graduates from all institutions participate? What is the time spent on the labor market?
- **Reliability of the information.** Are all the data collected using a methodology that allows for meaningful comparisons? Is there a proper validation process?
- **Level of details in the information.** Do the indicators provide labor market outcomes at the institutional and program levels?
- **Regularity of the information.** What is the frequency of updates?

Finally, observers have suggested that predictive analytics could be used effectively to map out future labor market needs and influence the shaping of curriculum and pedagogy. The city of Manchester, for instance, has tried to chart the competencies, skills, and attributes in demand in the Greater Manchester area by analyzing 600,000 LinkedIn profiles of people working in the region. The British Council recently supported a project to use big data for the same purpose in Africa. A pilot survey of graduates of pharmacy programs at the Universities of Ghana, Lagos, and Western Cape was successfully conducted to test the potential of mobile phones for the collection of labor market results data (Yeld 2018).

3.4.3. Importance of Coordination

One of the main challenges faced by LMOs is the lack of coordination among relevant government agencies. In many countries, the ministry in charge of employment and the ministry responsible for higher education each set up their own system without coordinating with the other. This results in duplication of efforts and lack of comprehensiveness of the labor market information system. To avoid this kind of limitation, it would be important for Kenya to design a system that builds on existing information systems and puts together the various sources of labor market information that can guide universities, students, and employers with respect to the relevance of existing programs and the labor market experience of graduates. This would imply close collaboration among the Department of Labor within the Ministry of Labor and Social Protection, the Ministry of Education, Science, and Technology, and CUE at the national, regional, and local levels.

Chapter 4. Spotlight on the Potential Use of Technology in Kenyan Higher Education

Providing online programs has been a cornerstone strategy for higher education institutions that have been able to increase access to quality education. This chapter seeks to accomplish the following tasks:

- Provide an overview of how these institutions have invested resources to build, implement, and market online programs.
- Highlight key initiatives for successful program design, including providing mentorship to online students, using open educational resources (OER), and implementing adaptive active learning.
- Include examples for how formal education programs can meet job market needs by partnering with coding education boot camp providers.
- Outline opportunities for innovative program delivery enabled through online learning, including micro-credentialing, industry-university partnerships, foundational education programs, and competency-based assessment.

4.1 International Strategies, Models, and Experiences

The core initiatives suggested center around five key areas:

- **Investing in expertise in online course development**, including in instructional design competencies, and establishing cross-functional teams with leadership support
- **Developing student support structures**, including investment in ongoing mentorship, while leveraging technology to improve retention and student success
- **Innovating in program design**, through the use of OER, with more modular and personalized content
- **Innovating in program delivery**, leveraging online learning to serve working adults with flexible options and more modular badging structures, in collaboration with industry partners
- **Providing practical ICT and 21st century skills education**, through partnerships with coding education providers, hubs, and industry leaders

The government should consider how these strategies can be implemented in Kenya in collaboration with university, TVET, and Adult Continuing Education (ACE) partners.

4.1.1 Building Online Learning Programs: Outcomes and Best Practices Overview

Online learning, which used to be a ‘nontraditional’ path, is now integral to the higher education ecosystem. In Australia, Brazil, Canada, China, India, Russia, South Africa, Turkey, and the United States, nearly one-fifth or more of all higher education students are taking some online or distance education courses and programs (Contact North 2018). Reflecting skyrocketing tuition costs, unpredictable return on investment, and job market pressure for practical STEM skills, overall postsecondary enrollment in U.S. colleges and universities is down, while online enrollment for these institutions is up. The National Center for Education Statistics reports that overall postsecondary enrollment in the United States dropped by almost 90,000 students, nearly half a percentage point, from fall 2016 to fall 2017, while the number of students who took at least some of their courses online grew by more than 350,000, up 5.7 percent. About one in six students in 2017 enrolled exclusively in online courses. The share of all students in mixed online and in-person courses grew slightly as well (Lederman 2018).

Considering Program Format: Online and Blended Learning

While historic research on online learning has demonstrated mixed outcomes, well-designed and supported online or blended—a mix of online and face-to-face instruction—programs have led to positive academic outcomes, improved graduation and retention rates, faster time to completion, and cost savings. In a report that examined 24 studies published between 2010 and 2016, the research indicated that digital learning has had mixed academic impacts. Several studies did not find any meaningful difference between online and face-to-face offerings; others found worse outcomes in digital formats, and more seminal studies demonstrated more positive academic outcomes for students in well-designed and supported digital programs. A meta-analysis of 50 empirical studies of online learning over 15 years found that students performed slightly better in mixed-modality implementations, with both online learning and face-to-face components, than in face-to-face only implementations. Students in that study also performed better in fully online implementations than in face-to-face implementations, but to a lesser extent. In a 2018 case study analysis of six U.S. higher education institutions with a range of online offerings, digital learning initiatives resulted in improved student outcomes—including higher retention rates, higher graduation rates, and shorter average time to degree achievement (Bailey et al. 2018).

- At Houston Community College (HCC), retention rates for first-time freshmen were 9–10 percentage points higher for students who took at least one fully online or mixed-modality course than for students who took all of their classes face to face.
- HCC students who took all of their classes online demonstrated higher graduation rates than students who took all of their classes face to face, but students who took a combination of face-to-face and online classes demonstrated the best outcomes. A study of 45,000 students from 30 community colleges mirrored these results, determining that the optimal course load ratio for degree completion is two online courses and three face-to-face courses for a full-time student.
- The percentage of students who earned an A, B, or C (the ABC rate) in online courses versus in face-to-face courses varied by institution, and the results were most promising in mixed-modality courses. At University of Central Florida (UCF), the ABC rates were 3

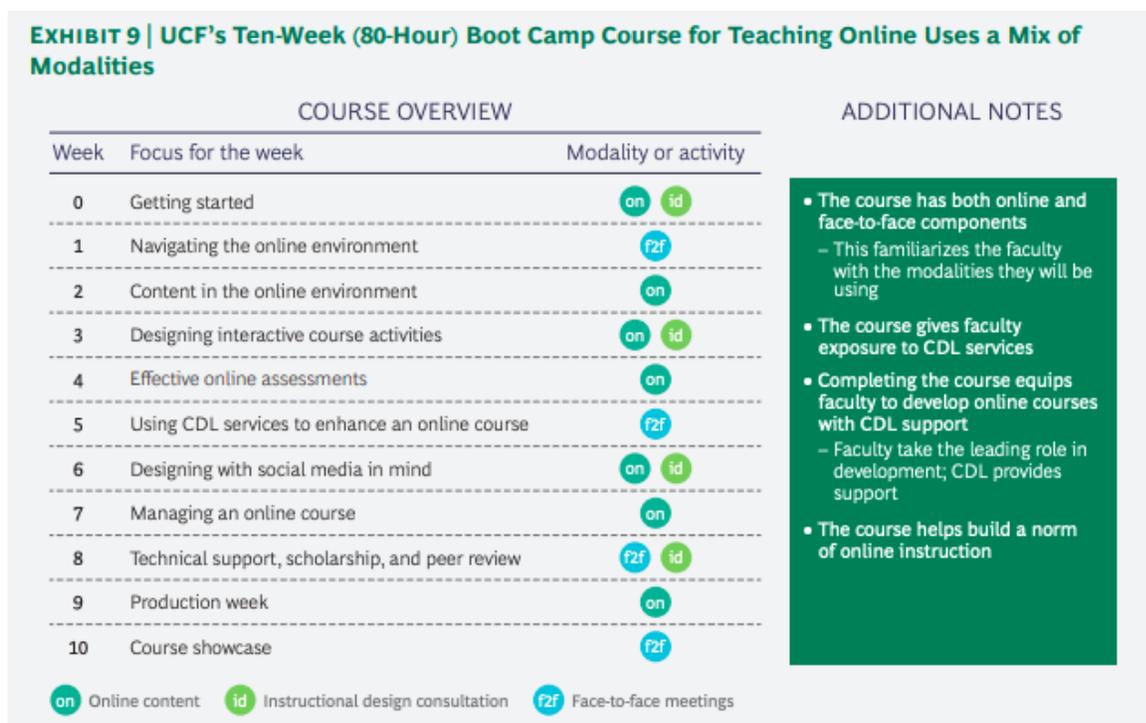
percentage points higher for students in mixed-modality instructional settings than for students in face-to-face settings. At ASU, ABC rates of students in online courses match those of students in face-to-face instruction.

- Two-year institutions demonstrated lower course grades for online learning than for face-to-face learning, demonstrating ‘the digital learning paradox’, where retention and graduation rates are higher for students in digital courses, but course grades are lower. At Kentucky Community and Technical College System (KCTCS), students who took a mix of face-to-face and online courses were 21 percentage points more likely to graduate than students who took only face-to-face classes, despite receiving grades that were 8–9 percentage points lower in online courses.

It’s important to note that online programs can require students to be more self-motivated in completing tasks, without the structure and physical presence of a teacher characteristic of face-to-face instruction, and as a result, more vulnerable students may experience further difficulties succeeding in programs that are fully online. Investing in best practices in developing online courses, including providing surrounding mentorship and support services, is critical to building online programs that can result in positive outcomes for an inclusive population. Additionally, several course design features of online programs have been correlated with more positive effects on student learning. These correlates include courses that underwent full redesign rather than limited development of supplemental resources, mathematics courses over courses in other subject areas, self-paced courses, courseware with embedded assessment, mixed-modality models with at least 50 percent of the course taught online, and programs powered by adaptive technologies (Means, Peters, and Zheng 2014).

Several techniques have emerged across institutions that have successfully delivered large-scale online courses. Institutions that are effective in these areas demonstrate substantial up-front investment in building quality digital programs, including investment in leadership, instructional design capacities, faculty onboarding and training (**Error! Reference source not found.**), student support services, and a robust data infrastructure to enable continuous feedback loops. Online courses are not simply online versions of the campus offering—nor are they static, digital experiences. Engaging online courses require interactive platforms, with dynamic content that reflects the curricular approach of the institution and its instructors. Additionally, it’s critical to consider program format in designing effective digital learning experiences—whether a fully online or blended model is optimal considering factors including the student population, available technologies, assessment requirements, and subject matter.

Figure 13. Faculty Training for Teaching Online - UCF



Source: Bailey et al. 2018; UCF; UCF interviews.

Note: CDL = Center for Distributed Learning.

Investing in and following good practices in program design are a critical priority, from vocational training through full degree programs. Box 17 demonstrates the overall investments a community college has made in growing its online presence, while Box 18 outlines the digital transformation process and required resources at ASU, the #2 online program in the United States at the university level (Bailey et al. 2018).

Box 17. Houston Community College and Investments in Online Programs

At the community college level, HCC has established itself as a distance learning leader and has implemented a strategic plan to innovate as online learning has increased. HCC is one of the nation’s 10 largest higher education institutions, and about half of its students take at least one online or blended course each semester; the growth of online learning has helped offset declining face-to-face enrollment. HCC has experienced a ‘digital learning paradox’ that has been demonstrated at other institutions; students who engage with online learning have higher degree completion rates but demonstrate lower performance rates in individual courses. Administrators identified potential causes for this gap, including a lack of preparedness for online learning and teaching among both students and faculty, lower levels of student-instructor interaction, and expectations that online learning takes less time than face-to-face learning. To improve course-level outcomes, HCC has invested in several strategies as part of its digital transformation.

For student support, HCC provides free online tutors and a ‘Student Success’ course designed to prepare students for the demands of college, covering topics including time management, effective note-taking, test-taking skills, and task prioritization. HCC Online has also appointed its own set of advisors to guide online students.

At the institutional level, HCC Online has appointed a president of HCC Online and hired a dean of HCC Online and instructional technology. For course development and quality, HCC has invested in a team of 20 instructional designers to help faculty design department-level digital courses and individual courses, as well as provide professional development for online instructors. To reduce the cost of course materials, HCC is increasing the use

of OER. A pilot of three humanities courses demonstrated that the share of students who received an A, B, or C grade in the OER-based sections was 10 percentage points higher than in the textbook-based sections. Following up on the success of this pilot effort, HCC is now offering a Z-Degree program (a degree with zero textbook and instructional material costs) in these associate degree programs.

Source: Bailey et al. 2018.

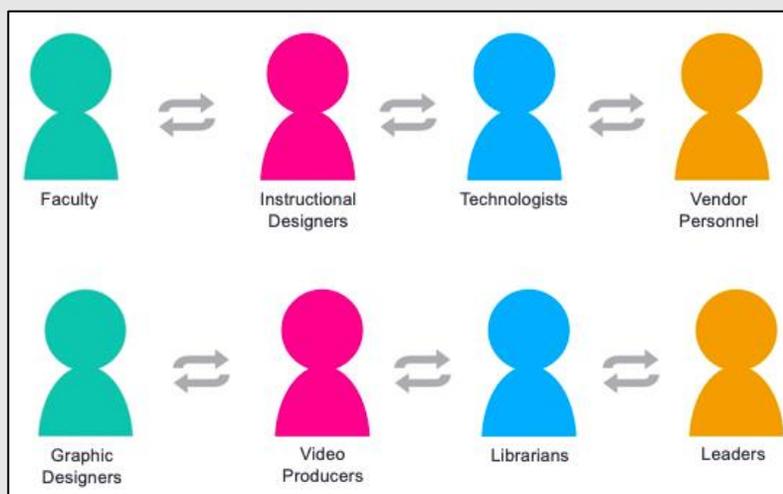
Box 18. ASU Online - Driving Inclusivity and Innovation

ASU, the number two online bachelor’s degree program as designated by U.S. News and World Report (2019), calls its collaborative course design process an essential component of the university’s success in developing learning experiences that are both engaging and scalable. Of ASU’s 108,000 students, 32,000 are fully online students. For these students, ASU offers 170 online degree programs (ASU Overview Presentation 2019).

ASU’s success in growing its digital programs has been fueled by its culture of innovation; from 2014–2018, ASU was named the number one most innovative school in the nation. This culture is driven from the top, from ASU’s president Michael Crow. Crow came to the university in 2002, and in his inaugural speech, he outlined that ASU should be a public research university “measured not by who the university excludes, but rather by who the university includes.” While elite universities in the United States boast their low acceptance rates as a measure of their selectivity, ASU’s mission has been to surpass 100,000 students by 2020; a measure they have achieved ahead of schedule. Under Crow’s leadership, ASU has focused on recruiting talent as a critical component of its growth strategy (Leingang 2019).

At the core of ASU’s innovation is its EdPlus team, a roughly 300-person central team that supports all of ASU’s digital learning programs. The Dean of ASU Online and a Chief Design Officer drive leadership of the EdPlus organization. The team includes 22 instructional designers—who each support 50 to 75 faculty members—media and technology experts, student support services staff, and data analysts. While ASU has partnered with external vendors on different components of the system, including student acquisition, enrollment services, course content, technology development, and student retention services, much of ASU’s competencies are in-house, and increasingly so (Bailey et al. 2018).

Figure 14. Collaborative Course Design Team at ASU



Source: ASU Overview Presentation, 2019.

For department courses, ASU employs a ‘master course’ model, where the collaborative design team creates a master course shell to store all of the materials for an online course. The master shell model ensures alignment with ASU’s best practices in course design, accessibility, and branding standards, with the goal of maximizing access to student course materials and improving learning outcomes. Course integrity is maintained from one offering to the next, and efficacy can be measured, to learn and drive course improvements (Darr 2018). To create a master course shell,

- Instructional designers are paired up with a department, and faculty leaders are appointed to collaborate on course design;
- The faculty leaders and instructional designer determine a plan for creating course materials, including the course outline, resources, activities, and assessments;
- Instructional designers and technologists, along with any graphic design or video production support needed, work with faculty to build materials in the selected learning management system (LMS) - Blackboard or Canvas, for example;
- Copies of the master course are then propagated for each section of the class. Faculty are able to add content and make certain customizations but cannot edit other elements. For example, an exam may be standard across sections, depending on the course;
- The faculty leaders support training other faculty at the beginning of each semester. Throughout the semester, all faculty are provided with resources and access to the instructional designer for questions or issues. Newer faculty can also be assigned faculty mentors to help with any questions;
- When changes need to be made and between terms, copying a master shell and working from the new version removes the possibility of copying old content, out-of-date materials, or discarded learning activities; and
- Each semester, ASU conducts a 360-degree review process to evaluate student satisfaction and course grades, to improve course quality over time.

Source: Johnson 2019.

Given the crucial role of instructional designers in building online programs, it is helpful to outline core skills required for success in the role (Van Horne 2013).

- **Communication.** Listening, speaking, writing, presenting, and collaborating - building consensus is an important part of day-to-day work with faculty
- **Creativity.** Brainstorming, experimenting, inventing, and blending human psychology with technology
- **Design.** Designing teaching and learning experiences - aligning objectives, activities, and assessments
- **Technology.** Fluency in creating digital content and managing digital products, often with multiple integrations and components
- **Relationship building.** Building relationships and rapport with faculty, staff, and clients
- **Analyzing data.** Data-based decision making - including review of materials
- **Project management.** Building planning maps, process documents, and storyboards
- **Curiosity.** Continued learning on top of the latest processes and skills related to instructional design work
- **Problem solving.** Fixing issues in courses or any other aspect of implementation

Students are engaging with coursework on mobile devices, and it is important to develop courses with mobile use in mind. In one study, 87 percent of online students accessed material on mobile devices, and 67 percent completed coursework on mobile devices. Common activities on mobile

devices included accessing course readings, communicating with professors and fellow students, accessing the LMS, conducting research for reports, completing assignments, and accessing lectures (Magda and Aslanian 2018). While mobile learning in higher education is not currently well researched and understood, creating mobile-optimized content is important for engaging students increasingly working on mobile devices.

Strategies in action. Synthesizing best practices for building online courses can summarize how to put these strategies into action.

- **Innovate from the top.** Outline a clear vision for the institution and where online learning fits into that vision; recruit innovative leaders; and foster a culture of innovation by rewarding creative ideas, piloting new initiatives, and enabling staff to make mistakes as part of the learning experience.
- **Invest in infrastructure.** Equip learning spaces and areas where students will do homework with high-speed Internet; provide access to labs and learning centers with computers for students who do not have Internet access at home; redesign learning spaces for active learning in groups - outlined further in Section 4.1.4.
- **Centralize expertise.** Build a central team with cross-functional expertise to deliver online courses and implement a master course model for course development.
- **Build human capital - especially in instructional design competencies.** Invest in competencies required for successful course development - including instructional design, digital tool development, and practical research capacity. Considering whether to build a central, national team with this expertise, to then support universities, TVET centers, and ACE programs in building and implementing digital initiatives, is a discussion point for the government.
- **Develop a framework for university-student interaction.** Provide a mentorship structure and community-focused features for online students.
- **Provide ongoing professional development.** Partner with faculty throughout the course creation process and ongoing implementation and provide ongoing training.
- **Optimize content for mobile.** Create materials to engage the growing numbers of students accessing content on mobile devices.
- **Evaluate course-building and delivery vendors/partnerships.** Determine how external partners or vendors can supplement an internal team if necessary:
 - Consider whether collaborating with a **MOOC** provider can help generate awareness and increase enrollment in a course or program - *see Section 4.1.2.*
 - Conduct a needs analysis to determine whether collaboration with an **Online Program Manager (OPM)** can support aspects of online course creation or delivery—see

Section 4.1.3. If collaborating with an OPM, ensure that a sustainable business model and implementation plan are in place.

- **Drive iterative improvements with data.** Outline desired success metrics, measure outcomes, and have a plan for putting research into action; invest in a practical research group that can both measure outcomes and collaborate to put findings into action.

Online Learning Landscape - Open Universities

While campus-based universities have established online learning offerings as the demand for these programs increases, institutions that have historically offered Online and Distance Learning (ODE) are still important providers. Turkey's Anadolu University (AU) and South Africa's University of South Africa (UNISA) are by far the largest providers of distance education in each of those countries; in India, the Indira Gandhi National Open University (IGNOU) and Yeshvantrao Chavan Maharashtra Open University each enroll more than half a million students. However, online education is becoming further embedded in strategies of conventional higher education institutions. In the United States and Canada, on-campus institutions are the largest providers of online education, and over 80 percent of higher education institutions in Europe offer online courses and distance learning to students. Globally, high-profile institutions—including Beijing Normal University in China, Lomonosov Moscow State University in Russia, the University of Cape Town in South Africa, and some Ivy League institutions in the United States—are offering online programs (Tait 2018). Existing distance education providers now have to consider brand and institutional trust as part of the competitive landscape.

In the half-century since the founding of the Open University in the United Kingdom, more than 60 open universities or single-mode distance teaching universities have been established, with the largest number in Asia, followed by parts of Europe and Africa. In the 1980s and 1990s, open universities experienced massive enrollment increases. Open universities have shared several characteristics underlying their growth, including

- **Vision and mission.** Moving from an elite to a mass higher education system, focusing on openness and access at significant scale;
- **Innovation in learning and teaching.** The admission of nontraditional student cohorts, demanding flexible learning opportunities for working adults;
- **Innovation in technologies for distance learning.** Online teaching, peer learning, OER, MOOCs, and other online activities—initially, this innovation was based on developments in instructional design, combined with TV and radio; and
- **Innovation in educational logistics.** Management of scheduling and support services to students in large numbers.

Challenges that open universities have experienced in recent years include (Garrett 2016):

- **Enrollment loss or decrease in market share.** While about half of open universities have experienced growth, about half are suffering from declining enrollment and, in some cases, accompanying financial difficulties;

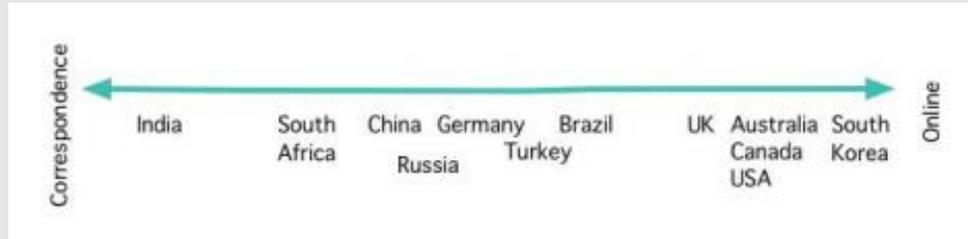
- **Lack of published performance data on outcomes and graduation rates**, which contributes to accreditation, reputation, and recruitment difficulties;
- **Brand differentiation**, as high-profile conventional universities adopt distance learning initiatives; and
- **Poor student and community support**, an issue that is being addressed through innovative technology use (see Section 4.1.2).

Box 19 describes course delivery methods at some open universities.

Box 19. Course Delivery Methods at Open Universities in Commonwealth Countries

Open universities demonstrate a range of delivery models. As with traditional universities, in open universities, continued use of legacy technologies—including print, radio, and DVDs—reflects uneven access to technologies, resistance to innovative methods of teaching, and pedagogical concerns around wholly online delivery.

Figure 15. Spectrum of Online Delivery in Global Markets



Source: Contact North 2018.

Examining delivery methods for open universities in Commonwealth countries demonstrates this spectrum.

IGNOU: India's IGNOU runs 56 regional centers and over 3,000 study centers within those regions, offering library and audio-visual facilities, as well as Internet access for learners who do not have it at home. Regional centers train local counselors, conduct certain examinations, and liaise with local authorities. Offering a range of access options for materials, IGNOU offers print materials, online courses, and satellite-based radio and television programming, with the content now archived on YouTube.

UNISA: While UNISA began through print-based correspondence, the globally ranked university has been moving to a largely online-centric model. Regional centers offer group-based tutoring sessions, as well as student support and technology facilities. Support counselors at regional centers are also available by phone and email, and online or 'E-Tutoring' is increasingly employed for academic tutoring. UNISA offers students inexpensive options to purchase computers and Internet access and is experimenting with offline storage devices for students with no Internet access at home or work.

Open University Malaysia (OUM): OUM's programming includes blended and fully online learning options. Both online and blended students access digital study materials as they engage remotely with peers, tutors, and faculty, as well as in asynchronous online discussion forums. Blended students also access printed materials and participate in three to five two-hour face-to-face sessions with 25—30 other students and a tutor at one of 13 learning centers across Malaysia.

Open Universities Australia (OUA): OUA offers four delivery mode options: fully online; 'web dependent', with most material delivered online, plus some physical items; 'web supplemented', with mostly physical materials and some online content; and 'print only', with the option to contact support services electronically. Student coaches are available for all students on demand through phone or online to help with study skills. OUA contracts with Smarthinking, an American student support firm, to provide this service at no extra cost to students. There is also a 'Study Tracker' online tool to help students manage deadlines. (See Section 3.1.3 to learn more about OPMs, organizations that can help build and implement online courses.)

AU: Turkey's AU utilizes a range of delivery methods, including online activities, print materials, computer software, audio/video conferencing, audio/video tapes, TV, and radio. While most undergraduate courses are self-paced, allowing continuous enrollment, some require or have the option of group study, through which a faculty member works with a group of students, either online or in person at a partner institution.

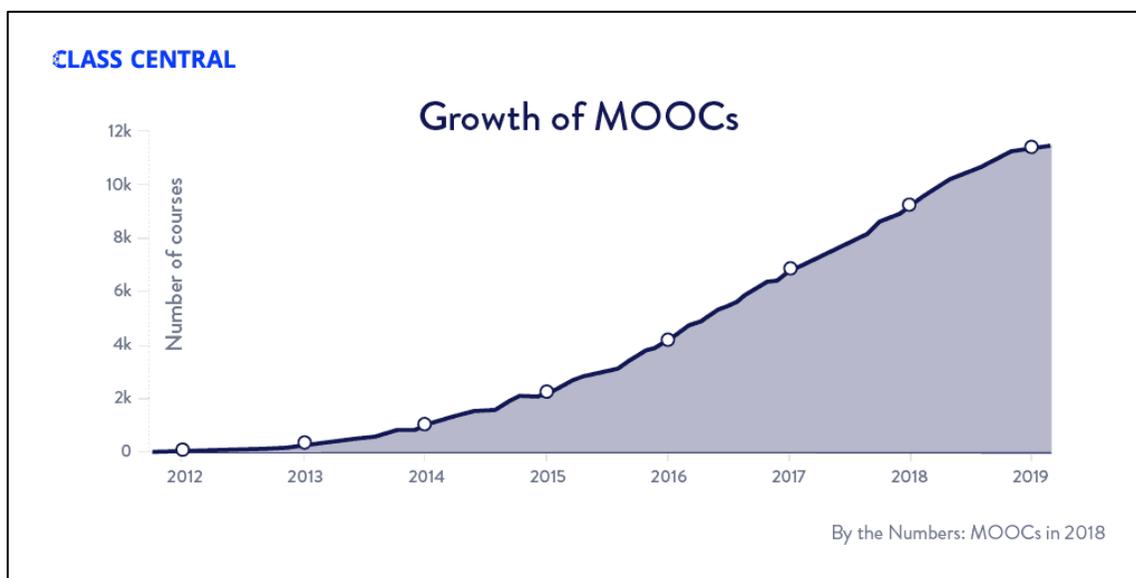
Open University of Sri Lanka (OUSL): While OUSL is growing its online course offerings, the university operates primarily with print-based and other physical study materials (including CDs and DVDs of the university's radio and television content), with a national network of regional centers and study centers. While part-time enrollment is common with open universities, all the OUSL students study full-time.

Source: Garrett 2016.

Considering MOOCs for Increasing Access to Online Education

While there has been much controversy over the educational value of MOOCs and their implications for higher education institutions, these offerings have shaped the landscape of university and online education. To date, about 100 million people have signed up for a MOOC (Shah 2018). The original model for MOOCs enabled learners to sign up for university courses at no cost and to then pay to receive university certificates for those courses upon completion. The major MOOC providers—Coursera, edX, XuetangX, FutureLearn, and Udacity—enabled universities that may not have had the motivation to invest in putting courses online, or the competencies to develop online courses, to do so with minimal up-front investment. Additionally, MOOCs enabled institutions to market to a wide range of students, with the potential to receive revenue from students who would go on to complete courses for credit.

Figure 16. Growth in MOOC Offerings



Source: Shah 2018.

While MOOCs have been criticized for their low completion rates and a lack of standardized acceptance by the workforce, they have provided value both to a vast number of students and to universities. HarvardX and MITx, both in partnership with the MOOC provider edX, have reported that only 5.5 percent of the people who enroll in one of their open online courses earn a certificate (Chuang and Ho 2016). The free offerings, without student support services, have historically offered low motivation for students to complete. However, learners globally report positive impact even in cases where they may not have completed courses, and those who do complete have found their experiences to be valuable. The results of a 2016 survey of students in three developing countries, Colombia, the Philippines, and South Africa, indicate that the proportion of students completing courses in these markets was high, at 30 percent. About 49 percent of users received a certificate, and women were more likely than men to complete an MOOC or get certification. Additionally, users did not communicate that a lack of computer access or prior skills was a significant barrier (Garrido et al. 2016).

Fear that MOOCs would threaten universities has shifted to a public sentiment that MOOCs and universities present a mutually beneficial partnership. MOOC providers are changing their business models and evolving their value propositions to address commercial and engagement issues. Courses that people can register for, free of charge, are now being monetized at differing pricing levels, with the free product serving as a marketing channel to acquire customers and then convert them into paid students. For example, in 2014, Georgia Tech launched one of the first paid MOOC offerings, and it now offers several of its master’s degree programs as MOOCs—for a fraction of the cost of the in-person experience. Though Georgia Tech did not reach its target of enrolling 10,000 students by 2017 with its initial computer science master’s program, three years after the program’s launch, enrollment did grow from 380 students to 6,365 students, becoming the largest master’s degree program in computer science in the United States, and likely internationally as well (McKenzie 2018).

The OECD Learning Excellence Report summarizes the six levels of pricing and academic recognition for MOOCs around the world in 2018 (Salmi and Orjuela-Laverde 2018).

- Free MOOCs with no academic endorsement
- MOOCs sanctioned by a single-course certificate
- MOOCs leading to a micro-credential (program with several courses)
- MOOCs giving a university credit to on-campus students
- Online degrees through MOOCs
- MOOCs as part of corporate training, whereby firms pay for the acquisition of certificates and microcredits by their employees

This variety highlights the expansion of the common definition of the term ‘MOOC’ to become more synonymous with ‘online learning’. Conventional and open universities alike are leveraging MOOCs as part of their programs and enrollment strategies, and boundaries between different categorizations of online learning are evolving. Considering the best use of MOOC provider partnerships—for example, to increase awareness around online programs at universities—is a discussion point for institutional stakeholders in Kenya. Additionally, the European Union’s Virtual Mobility (VM) initiative brings together open online resources, including MOOCs and Open Educational Resources (OER), to increase access to quality education programs across borders (Open Virtual Mobility, n.d.). Higher education institutions in Kenya can share best practices with the partner institutions in the EU’s VM network.

Considering OPMs for Course Building and Implementation Support

A main challenge for institutions in developing online courses is the required industrial design, technology, and product investment. As outlined earlier, creating engaging and effective online courses requires investment in instructional design teams, content creation, technical competencies and platforms, student engagement services, and marketing capabilities. OPMs partner with institutions on all or certain aspects of building and delivering online programs. The major OPM providers include 2U, which acquired South African Get Smarter in 2017 and Trilogy Education

in 2019; Pearson Online Learning Services; and Wiley. Reflecting the need to build online programs quickly to meet demand, the number of schools working with OPMs increased by 130 percent between 2011 and 2015 (Pelletier, n.d.).

Critics of OPMs point out that their business model adds too much cost to already-prohibitive tuition costs for students and that profit-seeking companies may have misaligned incentives with higher education institutions. Traditionally, full-service OPMs have invested capital to help universities develop online programs and receive a share of the tuition revenue over several years to recoup the investment. As these companies can take more than half of the tuition revenue, they have a financial incentive to do a good job marketing the program, enrolling students, and retaining them through coaching services, a critical service in the absence of brick-and-mortar supports. However, the added cost to students is substantial, and the model is not sustainable if universities do not develop the capacity to implement online programs themselves.

As online learning has become mainstream and higher education institutions seek to grow sustainable online programs, they have increasingly developed in-house capacity for building online programs. In response, OPMs are increasingly offering unbundled services to universities, whether that is around instructional design, marketing to students, servicing student health care, or engaging with students with ongoing support services. Universities can pay a la carte per service. With the evolution of MOOC partnership models, certain providers can be categorized as OPMs with some of their services and associated business models.

If higher education institutions seek OPM partnerships, they need to come to the table with a vision for moving courses and degree programs online, as well as a strong business and academic plan—versus relying on an OPM to solve their problems. With increasing growth of online programs and the resources required to build and service them successfully, OPMs may be of some value to universities, and it is important for universities to understand their strengths and needs in seeking to supplement their capabilities with an OPM.

As there is not a strong Online Program Management industry in Kenya, an important consideration is how to catalyze online course building and delivery experience in the country. Whether the government could help support the development of an OPM ecosystem, or develop such expertise centrally within the education department, is a core discussion point for the government.

4.1.2 Providing Mentorship to Students in Online Programs

An important tenet of building an online program is offering mentorship and community to students, to counter issues around retention, lack of connectedness, and job-seeking deficiencies. While distance learning programs can face challenges around persistence and engagement, there is also opportunity to use communication tools to innovate and provide mentorship services at scale.

Innovative online programs have implemented a mentor or ‘success coach’ model for regular communication with students in large programs. At the fully online WGU, mentors are the primary point of contact for students at the university. Each mentor works with 80 or 90 students at a time from a student’s enrollment in the university through graduation. Mentors communicate with their

mentees by phone at least once a week—far more frequently than the cadence reported by students at other universities. Communication can also take place through text and email. Mentors support students in their paths through WGU, helping them set goals and checking on progress regularly (Supiano 2018). Similarly, ASU employs ‘Success Coaches’, who guide students through their educational journeys while facilitating an individual connection to ASU. As a result, student attrition is at an all-time low. All ASU Online students receive personalized coaching support, including academic guidance, career services, wellness resources, academic tools, and goal-setting and goal progression tools.

Some universities and colleges contract with OPMs to provide support services to students. Box 20 describes a mentorship-focused partnership between an OPM and a community college.

Box 20. Coaching with InsideTrack and Ivy Tech Community College

Through a partnership with OPM InsideTrack, Ivy Tech Community College, a network of 32 campuses serving over 160,000 students in the state of Indiana, has been able to achieve outcomes around student retention and completion. In describing their 2014–2015 implementation success, InsideTrack noted that coaches paid particular attention to the following:

- Helping students articulate and connect to their internal motivation for being in school
- Setting realistic expectations and contingency planning
- Cultivating a sense of belonging, commitment to graduation and self-advocacy
- Driving students to engage with other campus support resources and coaching them to communicate with faculty and staff effectively
- Ensuring that students understood various campus communications and scholarship eligibility criteria, and strategizing with them to achieve the necessary academic progress
- Coordinating student escalations and cross-functional communication to optimize timely resolution
- Documenting student trends and feedback to identify policies and processes that may unnecessarily hinder student success

“First-year retention improved by more than 12 percentage points—a 33 percent increase compared to a three-year historic average and over 7 percent improvement on the previous year’s results. Students also made significantly more academic progress, with a 46 percent increase in the completion of credits attempted, resulting in an average of 61 percent more credits completed than the previous cohort.”

Source: InsideTrack 2016.

Leveraging Technology for Mentorship Programs - AI and Mobile

Institutions are leveraging data and building innovative technology solutions to scale support services while improving retention and student outcomes. Intelligent search and integrated support systems enable prospective and current students to seamlessly understand degree requirements, plan schedules, and check their coursework against graduation requirements. Using AI, systems can aggregate data about student performance, attendance, and patterns to flag at-risk students and provide valuable insight to virtual mentors, who can take a personalized approach to monitoring student progress. Box 21 describes how universities have developed early warning systems to improve degree completion, while Box 22 outlines how one university has streamlined student support services.

in this region demonstrated that they were struggling in low-level core courses. As a result of introducing these courses, the AOU saw a 34 percent reduction in withdrawn students from level-one (credit-bearing) math courses. Additionally, each student is assigned a ‘Student Risk Factor’ (SRF) score, which enables counselors to identify students who are struggling and in need of extra support (IBM 2017).

Box 22. i-Counseling at Open University Hong Kong

Established by the Hong Kong Government as a self-financed tertiary institution, the Open University of Hong Kong (OUHK) reported a total enrollment of about 19,000 students in 2012, across its three study modes—distance learning for working adults; full-time, face-to-face teaching for high school leavers; and e-learning for postgraduate studies.

Current and prospective students have diverse needs and inquiries related to program or course choices, academic qualifications, study plans and graduation checks, and career guidance and development. Academic counseling questions sometimes require time-consuming administrative work and labor-intensive campus visits, for a population that may have limited time and availability. In an effort to consistently provide on-demand counseling services, the OUHK developed the i-Counseling System, an intelligent online information retrieval system.

The i-Counseling system helps students with course selection by suggesting appropriate courses and informing them of the program requirements. It also automates the administrative work involved in student graduation checks—and does so more accurately than manual processes. The module needs less than three hours to complete a graduation check of 1,000 students in the nursing program—a task that previously required three teams of academic and administrative staff working together for several weeks to complete. Faculty are provided real-time visibility into student coursework and outstanding requirements, enabling more meaningful intervention with students.

Source: Leung and Tsang 2012.

Meeting students where they are means leveraging mobile devices for mentorship and course engagement. With the ubiquity of mobile use, mentors have found success in communicating with students through SMS, including sending assignment reminders, motivation messages, and study tips. Systems that support sending these notifications enable mobile engagement initiatives to scale. While the need for mobile learning is increasing, the effectiveness of mobile learning initiatives is not well researched. However, early pilot programs demonstrate promise, especially around engaging students with content, resources, and community. Box 23 reports on the experience of OUM.

Box 23. Encouraging Students with SMS at OUM

With a vision of being the leader in flexible learning, OUM initiated a Mobile Learning via SMS initiative in 2009, in an effort to support distance learners, who are mostly working adults. By 2011, the initiative reached 13,200 learners.

Communication was broken down into five categories, outlined in Figure 18.

Figure 18: Engagement Categories for SMS Messages at OUM

Category	Purpose	Example
Content	To help learners locate/remember important course facts easily	There are 4 pairs of learning styles: Active/Reflective; Sensing/Intuitive; Visual/Verbal; Sequential/Global. Which is yours? See Appendix 1.1.
Forum/Facebook	To remind and motivate learners to participate in discussion forums	Would you consider Tony Fernandez a successful entrepreneur? Why do you say so? Post your views in LMS forum.
Tips	To provide hints/strategies on how to do well in their studies	Revise focus assessment for renal patients and effective nurse-client communication in preparation for OSCE.
Motivation	To motivate learners to persevere in the learning process	To succeed, we must first believe that we can. By Michael Korda. Always believe in yourself :-).
Course management	To provide timely announcements/reminders related to tutorials/assessments	Your assignment is due next week. Remember to submit by T4. Best wishes!

Source: Lim, Fadzil, and Mansor 2011.

Results from evaluations of the initiative demonstrated that students believed that the SMSes helped them to stay focused and engaged in their studies while providing important information related to the course. Each semester, over 95 percent of the learners involved wished that other courses would adopt the SMS engagement program.

Source: Lim, Fadzil, and Mansor 2011.

Strategies in action. Synthesizing best practices for providing mentorship to online students can summarize how to put these strategies into action.

Considering how the government can help support and incentivize building a framework for critical mentorship programs is an important discussion point.

- **Build a team of mentors.** Connect students to the university culture, and guide them with tips, motivation, and support through virtual mentorship; each student should have regular interaction with a mentor through calls, emails, and text messages.
- **Leverage data and AI.** Develop a data portal for mentors to access student performance, attendance, and engagement data; predictive analytics systems can provide early intervention flags.
- **Use mobile devices to meet students where they are.** SMS mentorship initiatives can help with course content, motivation, study tips, and course management.

- **Focus mentorship on STEM students and match students to relatable mentors.** Cultivate and scale the limited expertise in these fields; match female and minority students with mentors who have similar backgrounds.

4.1.3 Decreasing Course Material Costs with OER

The cost of textbooks prevents students from enrolling in courses, while negatively affecting completion and student success rates. In a 2018 survey, 89 percent of department leaders at U.S. colleges and universities agreed that the cost of course materials was a serious problem, and only 60 percent of all teaching faculty believed that over 90 percent of their students could afford course materials. Even with increasing access to discounted books sold online and free or low-cost online resources, the average cost of college textbooks has risen four times faster than the rate of inflation over the past decade (Seaman and Seaman 2018). According to the College Board, the average student spends US\$1,200–1,400 per year on textbooks and supplies, a sum that amounts to as much as 39 percent of tuition and fees at a community college and 14 percent of tuition and fees at a four-year public institution (College Board, n.d.). Individual textbooks often cost more than US\$100 and, in some cases, can cost over US\$200 or even US\$300. Consequently, an estimated 65 percent of students skip purchasing required textbooks at some point in their college career. OER’s cost-savings value proposition is especially important for lower-income working adults attending community colleges.

As a result of these prohibitive course material costs, the use of OER in higher education has been increasing. OER materials apply public copyright licenses that enable works, including text, media, and other digital assets, to be freely shared and modified. With OER, instructors are free to customize the content to their educational needs. Though OER materials are far from mainstream, awareness and use of them in U.S. higher education is increasing. In the 2017/18 school year, 46 percent of faculty self-reported that they were generally aware of OER, a 12 percent increase over 2014/15. The rate of department-wide OER adoptions has risen from 5 percent in 2014/15 to 13 percent in 2017/18 (Seaman and Seaman 2018). With increasing focus on creating positive course experiences around OER materials, the quality of OER-based courses is improving. In a recent study, 60 percent of students reported that the overall quality of their learning experience in an OER course was higher in comparison to a typical non-OER course (Griffiths *et al.* 2018).

Several models have emerged for OER courseware in higher education. Major OER providers, including OpenStax, OER Commons, Merlot, and MIT OpenCourseWare, provide a wealth of free and open digital materials, and OERdegrees.org offers guidance for building an entire degree pathway around using OER materials. OpenStax, which launched in 2012 out of Rice University, now offers 29 free college and high school Advanced Placement (AP) digital textbooks, and students can pay for printed versions of the textbooks for US\$30–55. A leader in innovating around OER experiences, OpenStax is now launching higher-end digital versions of its offerings. The OpenStax ‘Tutor’ product enables instructors to build assignments and track progress with OpenStax content for US\$10, and its ‘Rover’ product provides step-level math homework practice for US\$22 (openstax.org, n.d.). At US\$40, Knewton provides an adaptive lower-cost textbook built with curated OER content through its ‘Alta’ platform. Alta is built using OER content curated by education experts and includes course administration and tracking features for teachers. Students receive personalized paths through courses, while instructors receive data on student performance to target intervention (knewton.com, n.d.). Educational publisher Wiley acquired

Knewton in May 2019, aiming to expand the adaptive learning platform to support its broad course catalog.

Creating a community to share best practices and learn from pain points is an effective strategy to drive OER adoption and implementation success. OERAfrica collects and shares best practices in OER education in Africa, enabling educators across the continent to learn from and effectively contribute to the OER community in Africa (oerafrica.org, n.d.). The Community College Consortium for Open Educational Resources (CCCOER) is a growing consortium of community and technical colleges committed to expanding access to education and increasing student success through the adoption of open educational policy, practices, and resources (CCCOER.org, n.d.). The CCCOER website provides access to case studies, resources, professional development, and guidance for institutional planning around OER, including an OER readiness assessment tool. OER communities can support the establishment and implementation of quality assurance measures critical to effective OER adoption. Higher education institutions and stakeholders in Kenya investing in OER program design can establish a process for thoroughly reviewing OER materials, as well as a rubric for assessing the quality of these resources.

Findings from case studies available through CCCOER reflect broader research demonstrating that in addition to cost savings, OER can be associated with increased enrollment rates, higher course completion rates, and improved student outcomes. One factor contributing to student success is the inclusive access to materials from the first day of class. Students who cannot afford a course textbook, or who delay purchasing materials due to the cost burden, are at risk of falling behind. The case studies linked from the site demonstrate outcomes including the following:

- **Cost savings.** The Maricopa Community College system set out to save students US\$5 million over five years and ended up saving students an estimated US\$11,520,000, while the City University of New York (CUNY) system estimates that it saves students US\$10 million per semester.
- **Increased enrollment.** Florida State College at Jacksonville surpassed its enrollment goals by 150 percent after implementing OER.
- **Student success.** Northern Virginia Community College (NOVA) demonstrated a 9 percent increase in student success rates with its OER pilot.

Major universities are demonstrating success with OER as well. Box 24 describes how the move to OER for large enrollment courses resulted in cost savings and improved outcomes at a large university in the United States, and Box 25 outlines the OER adoption process at the National Open University of Nigeria (NOUN).

Box 24. OER Adoption and Success at the University of Georgia

The University of Georgia (UGA) set out to decrease the cost of higher education and student debt by supporting faculty in adopting free, high-quality online textbooks. In 2013, the university selected faculty who taught large enrollment courses and who were also currently using an expensive textbook or textbook/technology package to transition to lower-cost OER alternatives. The majority of the content used was from OpenStax, though several different OER textbooks were included. UGA equipped faculty and university instructional designers with resources to curate content, create ancillary materials, and build the course delivery in their LMS. The OER course design teams implemented a student-centered pedagogy and flipped classroom model.

While previous studies have focused on cost savings and increased retention for students using OER textbooks, UGA has measured student success outcomes with its implementation. Courses using UGA's OER textbooks demonstrated a 5.50 percent increase in students with A grades, a 7.73 percent increase in A- grades, and a 1.10 percent increase for B+ grades after OER adoption and a 2.68 percent decrease in DFW rates (students who receive a D grade, an F grade, or withdraw from the class), all compared to non-OER textbook courses before the OER implementation. Part-time students demonstrated even more dramatic results, with a 53.12 percent increase in average course grade and a 29.54 percent decrease in DFW rates. Since 2013, more than 35,985 students have been enrolled in courses that use OER materials at UGA, saving students US\$3,266,930.

Source: Colvard, Watson, and Park 2018.

Box 25. How National Open University of Nigeria Adopted OER

With more than 180,000 students, the National Open University of Nigeria (NOUN) is the second-largest university in Africa. Following the 2012 UNESCO and Commonwealth of Learning (CoL) Paris Declaration on OER, NOUN decided to implement an OER adoption initiative, recognizing the potential to democratize teaching and learning. With a grant from the European Union, NOUN announced that it would release half of its content—over 800 courses—as OER by 2017. Internationally, NOUN was the first West African university to join the OERu, a consortium of 30 postsecondary institutions innovating around OER programs.

To achieve this goal, NOUN set up a special unit reporting directly to the vice-chancellor. In addition to generating awareness about OER, the unit has been charged with training and capacity-building workshops, including training on OER creation, assembly, use, and reuse, OER course building and transformation, and ensuring that the OER content is accessible in the NOUN ICT-enabled environment. In collaboration with UNESCO, the NOUN team developed a quality-assured OER conversion process, led by instructional designers, working with faculty, technical, and library staff. This process involved converting documents to editable formats, editing content and enhancing learning materials, and updating content to ensure relevance. Through this content evaluation and updating process, the OER initiative catalyzed faculty members and NOUN administration to improve the quality of educational materials.

The OER materials were released on the NOUN website as ePUB (e-book style format) materials, Open Document Text (ODT), and PDF. The ePUB version was found to be the most useful for staff and students as this format can be navigated using a wide variety of mobile devices. Students have positively rated podcasts that have accompanied many of the OER packages, enabling them to listen to courses while in transit—especially helpful for working adults.

In December 2015, with the support of the EU and the Hewlett Foundation, the university launched the NOUN OER portal, an online repository of over 40 NOUN courses using an open license. As a direct result of the OER initiative, NOUN committed to building at least 20 OER-based MOOCs to respond to the most important needs of learners across Nigeria. The first three courses were launched in 2016, in the History and Philosophy of Science, Information Literacy, and Study Skills. These courses specifically address the 1 million plus Nigerian students per year who pass the university entrance examination but are not able to secure an enrollment in higher education.

While initially skeptical about the quality of OER content, many faculty members soon found OER materials provided by other organizations and institutions both relevant and of high quality. The use of OER created by others also opened NOUN faculty up to sharing their own content, and as an additional benefit, open access journals supported faculty research efforts. Though many faculty members have embraced the concept of OER, many others have been more hesitant—especially around the idea of sharing their own courses within NOUN and externally.

Main challenges in OER adoption at NOUN have included changing faculty mindset to embrace the sharing mentality, educating faculty around the use of open licenses and interpreting these licenses to create and reuse OER, accessing OER, and evaluating OER.

Source: Contact North 2018.

Strategies in action. Synthesizing best practices for providing and adopting OER can summarize how to put these strategies into action.

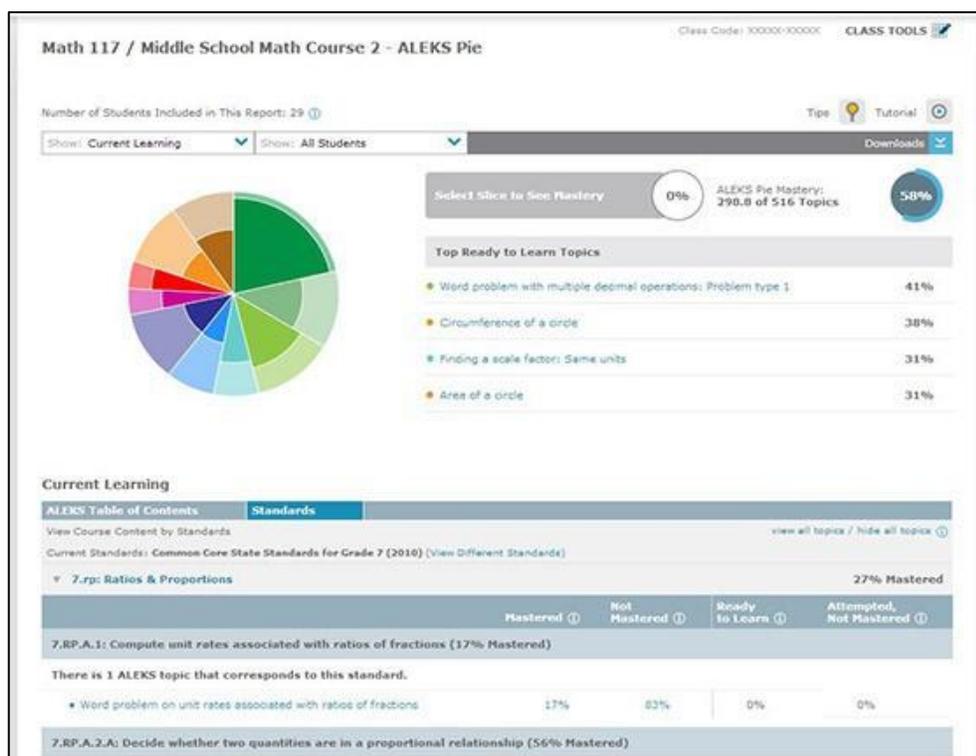
- **Budget for up-front investment.** Allocate funds to course development; according to a 2018 study, costs for implementing an OER course in the United States average US\$11,700 (Griffiths *et al.* 2018).
- **Build instructor capacity to develop OER courses and equip course-building teams with tools and resources for success.** Support course design teams with training and share knowledge with institutions that have developed OER courses; analyses of course development activities showed that courses took an average of 172 hours for instructors to develop, and time was spent on finding and assessing OER quality, on creating and revising content, and on designing courses (Griffiths *et al.* 2018).
- **Build a collaborative team to create a dynamic experience around OER content.** Build a cross-functional team, including instructional designers and technologists to ensure a strong student experience and smooth delivery through the chosen LMS.
- **Create an OER community.** Develop a central portal, like the CCCOER platform, to help generate awareness, build the reputation of OER content, and scale best practices. Institutions can also share the quality content they have curated from OER textbooks and across other sources (including YouTube), saving time on future course development.
- **Implement Quality Assurance Measures.** Create a process for ensuring that OER materials have high instructional and engagement value; this process may include a rubric for assessing materials and a peer review process.
- **Integrate best practice pedagogy.** Examine course pedagogy in the course redesign process, developing best practices in active learning and flipped classroom models.

4.1.4 Implementing Adaptive Active Learning to Improve Student Outcomes

Adaptive learning technologies leverage data coming from online courses, driving personalized instruction at scale. These teaching practices would otherwise be resource-intensive and very difficult, if not impossible, to manage. Students can receive better one-to-one instruction from teachers, who are able to use information highlighted in the data dashboards that are typically included with adaptive courseware, to tailor guidance based on individual student needs. Instructors spend less time grading assignments and more time teaching students, often in small groups, based on topics or questions that need extra review.

Adaptive courseware serves the right lesson to the right student at the right time. When a student answers a question incorrectly, sophisticated algorithms can triage the underlying cause—perhaps the student failed to pay attention to the instructional materials provided in the lesson, or it may be that those materials are insufficient in teaching the lesson’s core concepts; alternatively, the student may be having difficulty understanding a prerequisite concept covered in a previous section. To fill in the knowledge gaps specific to that student, the system serves up the best pieces of content.

Figure 19. ALEKS Adaptive Math Product Teacher Dashboard



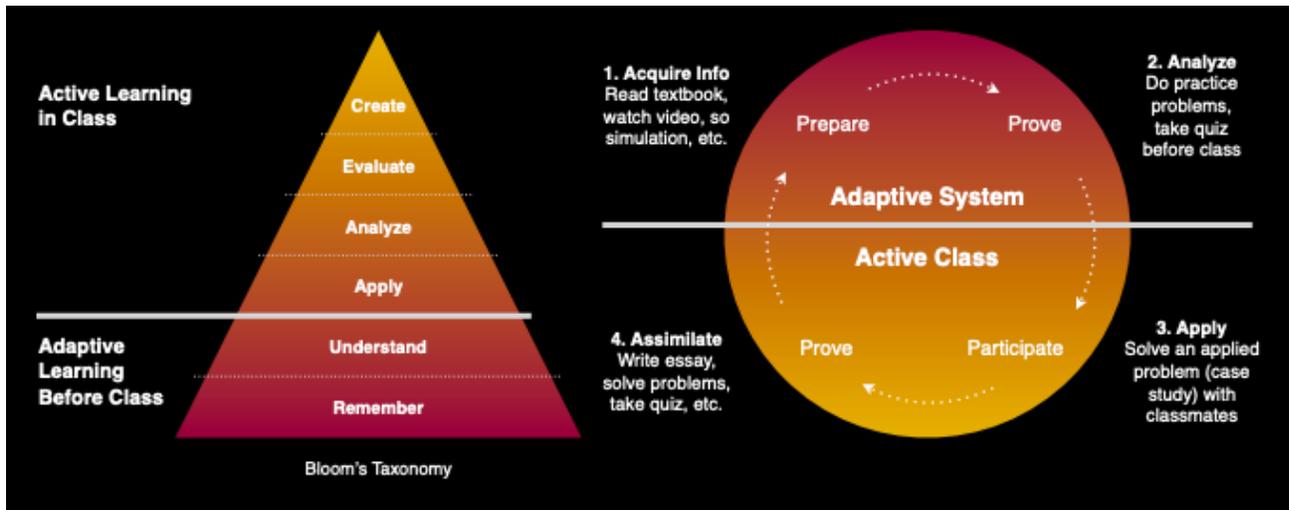
Source: ALEKS website.

Note: ALEKS = Assessment and Learning in Knowledge Spaces.

Well-designed adaptive learning technologies are powerful enablers for competency-based curriculum. Dynamic adaptive courseware requires continuous formative assessment to determine student strengths and weaknesses in real time. The knowledge maps required for these systems remediate students based on their competency gaps, ensuring that students master prerequisite concepts before engaging with more difficult, related material. The institution can choose whether, when, and how to layer summative assessment along with the formative assessment. See the discussion under Section 4.1.6 on best practices in implementing competency-based assessment.

Implementing adaptive learning is most effective with a redesign to support a flipped classroom experience. In a flipped classroom model, the class becomes the place to work through problems, advance concepts, and engage in collaborative learning, while students engage with online course materials at home or as a small portion of the class time. Adaptive technologies can support building foundational knowledge, and instructor interaction and project-based learning in groups builds on that foundation—optimizing classroom time for deep learning. These deeper learning activities can be described as the active learning component.

Figure 20. Adaptive Active Learning Model



Source: ASU 2019.

Active learning can take place in hybrid and online courses through the use of cost-effective technology. Technology-enabled active learning online is not just about lifting lectures or artifacts of lectures (PowerPoint presentations for example) and putting them online. Active learning can take place online through discussion boards, reflection questions, and virtual laboratory environments, especially in science courses with a laboratory component.

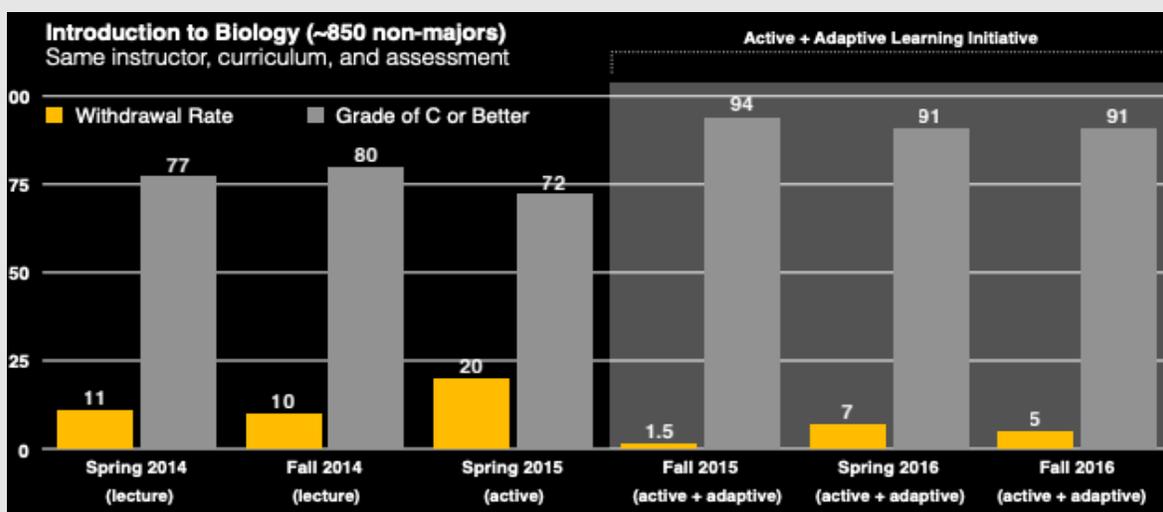
Many higher education institutions have started with large remedial courses, or first-year lecture courses, for adaptive course redesign. In large first-year lecture courses at colleges and universities, issues around engaging students from diverse backgrounds, and with differing levels of incoming knowledge and skills, are especially problematic. Some students may need to spend time revisiting primary-level skills, while other students may just need a quick refresher on more advanced concepts before progressing. The need to keep this population engaged has a profound impact. Of the millions of students taking remedial courses, at public two-year institutions, 49 percent of students completed the courses they attempted, and at public four-year institutions, 59 percent of students completed their courses. These failed courses put students further at risk by setting them on a path to leave school without a degree—all while having accumulated debt (Chen 2016). Longitudinal tracking for students, particularly in remedial math courses, demonstrates a poor outlook for degree attainment. A personalized approach keeps students engaged, focusing on building the competencies required for their future educational pathways, versus focusing on test scores—which is known to have been a barrier in the past for these students (Box 26). See the discussion under Section 4.1.6 on innovative approaches on increasing access to foundational education programs.

Box 26. Implementing Adaptive Active Learning at ASU

Identifying the need to address key challenges around course completion, pass rates, and university retention to successfully scale, ASU implemented its adaptive active model beginning in 2011, with aims to decrease course withdrawal rates and improve success rates and retention. President Michael Crow notes the relationship between students who struggle to keep up with a one-size-fits-all approach and the downstream challenges they may face: “When students struggle to keep up, they may withdraw or drop the course, which can endanger their financial aid eligibility, make it difficult to catch up in new classes, and put them on a longer path to graduation.” (Belkin 2019)

Before ASU’s adoption of adaptive learning, the school was seeing a 50 to 55 percent student success range in its first-year college math courses. Upon switching to an adaptive questioning product and implementing an active learning model in class, the success rates in these courses rose by 20 percentage points. That model eventually was built out in a number of other disciplines, including biology and chemistry, physics, economics, history, psychology, and most recently, even philosophy. More than 65,000 online and face-to-face students at ASU have taken adaptive courses.

Figure 21. Withdrawal and Performance Rates in Adaptive Active Introductory Biology



Source: ASU 2019.

Courseware Partners

The adaptive courseware that ASU has used include the following:

- Math: McGraw-Hill’s ALEKS, Pearson’s MyMathLab, Khan Academy, and Knewton
- Physics: Pearson Mastering
- Biology, U.S. History: CogBooks’ CogWare
- Psychology, Economics: Cengage Learning Objects
- Science courses: Smart Sparrow’s Habitable Worlds

Active Learning and Overcoming Blockers

At ASU, adaptive technologies and redesigned learning spaces together facilitate deeper understanding of material through active learning. ASU has examined the blockers to adopting active learning to build a model that matches each blocker with an associated strategy for success.

Blocker: Active learning takes more class time, so instructors cannot cover as much material.

Strategy: Adaptive courseware enables more effective delivery of course content to students, personalized around their needs—so that instructors have more time during class to focus on facilitating active learning.

Blocker: Planning active learning exercises takes more prep work for instructors.

Strategy: ASU employs a ‘master course’ creation model, outlined in *Box 18*. This model involves collaborative up-front preparation with faculty teams and instructional designers. With master courses, a cross-functional team

prepares materials, assignments, and technology deployment for instructors, freeing up more time for instructors to do what they do best—to teach.

Blocker: Instructors lack the support, materials, and budget to try new teaching methods.

Strategy: The ASU leadership invests in growing its culture of innovation; with active learning classrooms, the university has invested in redesigning learning spaces to support project-based interactions, with attention to greater mobility, flexibility, and multiple device usage. To improve remote communication, ASU and other institutions are upgrading wireless bandwidth and installing large displays that allow for more natural collaboration on digital projects. As higher education continues to move away from traditional, lecture-based lessons toward more hands-on activities, classrooms are starting to resemble real-world work and social environments that foster organic interactions and cross-disciplinary problem solving.

Blocker: Large class sizes prevent the realistic implementation of active learning strategies.

Strategy: The real-time analytics dashboards provided through adaptive courseware enable teachers to easily identify struggling students to tailor intervention to the students who need it most. Teachers can use grouping features to group students based on their performance with different concepts, and then, target activities to best support each group.

Adaptive Course Building - Process

ASU appointed an Adaptive Program Manager to own the design and implementation of its adaptive programs. The Program Manager has been pivotal to the success and scaling of the university's adaptive programs. The process outlined below outlines the key ingredients for building a successful adaptive course.

A key decision that instructors, faculty, and administration make for each course is around course pacing. Supporting the self-paced aspect of this approach, ASU has implemented 'stretch semesters' in some of its classes, enabling students more than one semester to complete courses. In certain cases, ASU allows students who complete courses early to move on to more advanced courses. Tracking students in an entirely self-paced course is more complex, as students may be spread out through the course material. With 'synced' courses, exam dates are fixed, so students are expected to reach certain lesson milestones by dates outlined in the syllabus.

Adaptive Course Building Process

- **Start with course vision:** Instructional designers collaborate with faculty to determine the vision and purpose for building the adaptive course.
- **Outline curriculum:** Faculty leaders collaborate with instructional designers to determine course objectives and structure, including exams and course requirements.
- **Vet courseware:** ASU vets and selects adaptive courseware partners that meet the content, technology, and pedagogy needs for each course.
- **Align content:** Faculty committees review content included in the courseware to align course objectives with objectives included in the product. They also curate OER content and any other existing ASU content.
- **Create content:** Once faculty identify any gaps in the course content, they create an inclusive plan for instructors to work with instructional designers, technologists, and other media production specialists to create new content as needed.
- **Create assessment:** Faculty also create course assessments from the courseware products, along with any extra exam materials.
- **Create and share active learning activities:** Faculty collaborate to provide a pool of active learning activities to share. This pool is continuously updated.
- **Build course into the LMS:** The ASU instructional design team ensures that all of the content is configured in the LMS for the master course. The master course is then copied for each class section.
- **Determine and enable instructor agency:** Individual instructors are able to customize their own courses. Some learning objectives are required, and others can be removed based on the instructor's preference.
- **Provide ongoing training:** ASU provides training before each term, where instructors can learn about the technology and align with the course vision and active learning pedagogy. Instructors who are new to adaptive instruction may be paired with a veteran mentor. Instructional designers stay involved throughout the term.

- **Evaluate and iterate:** ASU measures outcomes in each adaptive course, to drive improvements during and after the semester.

Source: ASU 2019; Johnson 2019.

Strategies in action. The description of ASU’s course-building process outlined in Box 26 illustrates practical strategies and models to put to use in building an adaptive course.

4.1.5 Integrating Coding Bootcamps into Higher Education Programs

While coding boot camps have gained popularity in the for-profit education sector, the model is now emerging on college and university campuses. The number of graduates from coding education boot camp programs increased to over 20,000 in 2018, from an estimated 2,100 in 2012 (Eggleston 2018). Higher education institutions are now experimenting with the boot camp model, often in partnership with popular coding boot camp operators for instruction or support. Considering gaps that often exist in faculty competencies around developing practical coding curriculum, partnerships with coding education providers enable higher education institutions to quickly implement programs with measurable skills-based outcomes. The boot camps typically last 8–12 weeks, and each coding education provider develops its own unique approach and program, usually in partnership with employers recruiting students upon graduation. Coding schools continue to evolve their offerings to match high-demand domains, including data science, web design, and digital marketing.

Various partnership models have emerged between coding education providers and higher education institutions. Students at Baker University can enroll in the online coding programming provided by The Software Guild, and they receive a certificate from the university upon completion. With Concordia University, completion of The Software Guild’s program translates to 12 credit hours toward a computer science degree with the school. Trilogy Education white labels its coding programs to universities including Rutgers, University of North Carolina (UNC)-Chapel Hill, and the University of California, Los Angeles (UCLA), providing coding curriculum, development resources, career placement services, and support to departments aiming to own their programs but in need of development and implementation support. In creating their programs, Trilogy Education partners with industry leaders, including General Electric, Salesforce.com, and Bank of America Corp. (Gallimore 2016).

Employers continue to emphasize the importance of 21st century skills, including creativity, critical thinking, collaboration, and communication, along with computational thinking. Coding education provider Revature (Box 27) emphasizes the importance of the well-roundedness that accompanies a liberal arts background, along with the practical skills accompanying coding experience. They propose that universities prepare students well for the fifth job, but a coding boot camp can help students get started on the first job. Revature has established campus-based programs where a university’s recent graduates can apply. The company does not charge students or universities, recouping costs from employers who hire their trained workers. Trilogy Education has recently adopted a similar business model.

Policies that support and allocate resources for coding education initiatives are emerging. In 2015, The Obama administration launched TechHire, which has since transitioned to the nonprofit organization Opportunity@Work. Before transitioning, TechHire spread to over 50 communities and allocated over US\$150 million in grant funding for communities. Communities that received

funding developed programs that focus on innovative hiring practices, on job training that prepares students in months—not years—and on active local leadership (TechHire Initiative 2016). Opportunity@Work has expanded on the success of TechHire, aiming to support 1 million people in getting hired in the next decade.

An additional policy innovation focus has been around loan and financing models. Opportunity@Work has piloted a transparent, flexible, and affordable plan for students in STEM subjects to pay back subsidized education with their future income (Opportunity@Work, n.d.). To increase access to coding education programs, in 2016, the U.S. Department of Education launched Educational Quality through Innovative Partnerships (EQUIP), an initiative that allows the use of federal financial aid funds on nontraditional education programs that partner with colleges and universities, including coding boot camp operators (Fact Sheet - EQUIP 2015). The growth of this initiative is hindered by the lack of industry-wide evaluation standards, and organizations are pushing for the development of these standards—decreasing the risk for schools in offering, and for students enrolling in, these programs.

Box 27. Revature, CUNY, and Women in Technology and Entrepreneurship in New York

CUNY spans 25 campuses across New York City, with 11 senior colleges with baccalaureate programs, seven community colleges, and seven graduate schools. To better equip its diverse population with technical skills, in 2016, CUNY partnered with coding boot camp program Revature, and within the first year, 3,500 students applied. The aim, with Revature, is to enable 2,000 CUNY graduates to be hired and trained by Revature by 2022.

Revature does not charge students or universities. Students apply to work at Revature, and if accepted, they begin with a 10–14-week period of immersive, industry-aligned training. During that time, students may be eligible for subsidized housing and professional certifications paid for by Revature. After completing training, they are placed at Fortune 500 companies as Revature employees, with a contract to stay with Revature for two years to cover the cost of the training program.

Revature offers three tracks into its program:

- **Technology majors who are recent graduates of a partner university** can directly apply to be hired by Revature to begin the immersive training program.
- **Non-computer science majors who are recent graduates of a partner university** can begin with Revature’s SPARK track, designed for graduates of all majors who have little or no prior coding experience, with dedicated industry mentors to ensure success. SPARK Online is a free, instructor-led four-week online course. After completing the four weeks, participants are ready to be hired by Revature to participate in the 10-week onsite training.
- **Anyone** can engage with RevaturePro, online programs for all skills levels, ranging from beginner through advanced levels.

CUNY offers the Revature boot camp onsite at one of its campuses for its recent graduates, and all students and alumni have access to RevaturePro. In 2017, Revature and CUNY expanded their partnership to promote diversity, partnering with Women in Technology and Entrepreneurship in New York (WiTNY). WiTNY and Revature offer boot camps exclusively for women, featuring guest lectures by female leaders in technology who can serve as much-needed role models to aspiring female technology professionals. Additionally, Revature’s online mentors and trainers provide one-day introductory coding classes for freshman women on several CUNY campuses, with an aim of encouraging these young women to register for an Introduction to Computer Science course and to ultimately pursue a career in technology.

Source: Revature 2017.

Strategies in action. Synthesizing best practices for providing practical STEM skills with coding boot camps can summarize how to put these strategies into action.

- **Implement coding education programs.** Consider partnering with coding boot camp providers through various business models: current students can receive course credit and discounted rates; certain introductory courses can be delivered for free; and recent graduates can connect with future employment opportunities.
- **Establish standards.** Create evaluation standards for coding boot camps to ensure that students enroll in, and institutions partner with, vetted programs.
- **Build 21st century skills.** Foster critical social and emotional skills for the workforce, including critical thinking, creativity, problem solving, and collaboration. These skills can be part of active learning in a well-rounded coding education program.
- **Upskill educators.** Design a program for primary, secondary, college, and university educators to also go through these coding boot camps, bolstering their abilities to teach these subjects for longer-term sustainability.
- **Support upskilling and hiring initiatives with funding.** Enable students who receive financial assistance to access vetted coding education programs; provide grant initiatives that can fuel communities to improve the hiring process; and explore new financing models for students to pursue rapid-growth fields.

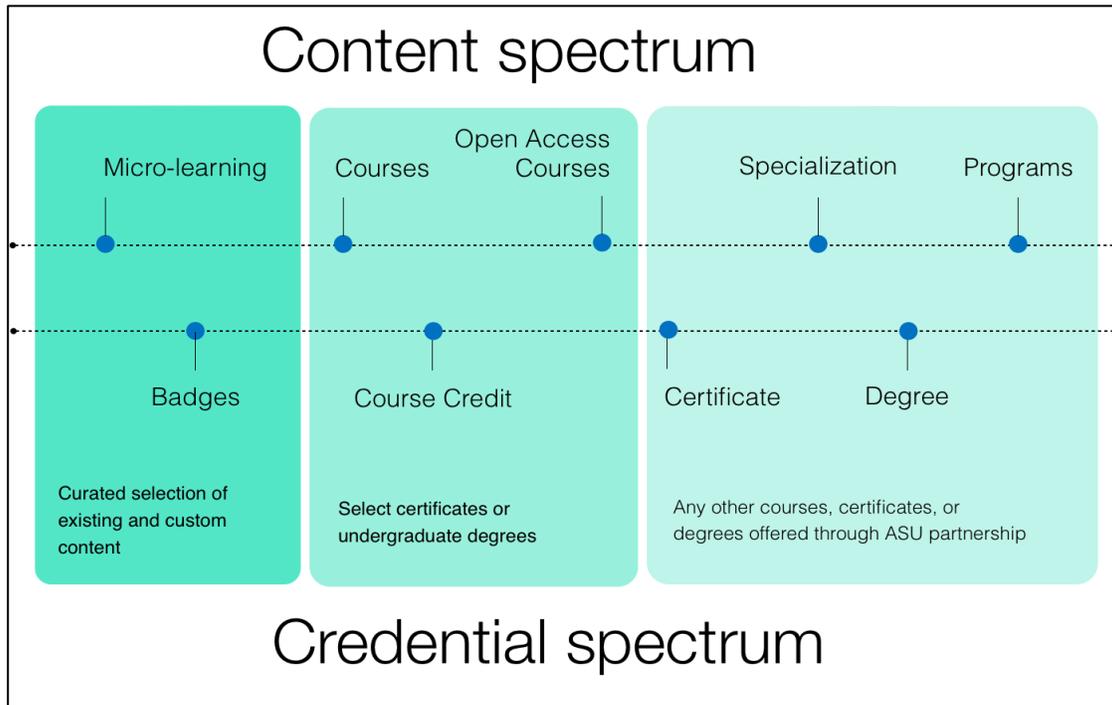
4.1.6 Designing Innovative Programs: Leveraging Online Learning

Institutions that invest in online learning experiences are able to reach adult learners where they are, at times when these learners need or would benefit from acquiring new knowledge or skills. Online content can be modularized to teach specific concepts relevant for particular market demands, and employers can offer flexible online learning opportunities to continuously upskill their workforce. Universities and colleges have leveraged online learning to design innovative programs that meet their pressing needs, enabling them to better provide practical modular credentials, form relevant and sustainable industry partnerships, and increase access to foundational skills education programs while redesigning assessment measures to be more aligned with a competency-based education model.

Upskilling with Micro-credentials: Unbundling Degrees with Badges, Credits, and Certificates

Adults are seeking learning opportunities as alternatives or supplements to degree programs, and it is important to consider alternative credentialing structures that are enabled through online education. The terminology used to describe the credential spectrum includes badges, course credits, certificates, and degrees. Badges are gaining popularity in demonstrating a competency with a skill; a course credit typically signifies that a learner has passed a course and is able to apply a credit toward a degree program; certificates are typically awarded upon completion of a more substantive learning experience—less modular than a badge but less comprehensive than a degree; and degree programs require that students meet qualifications, typically a number of required course credits in specific subject areas.

Figure 22. Aligning Content with Credentials



Source: ASU Overview Presentation 2019.

Some institutions that are innovating with flexible learning options are beginning to implement a ‘stackable credentials’ approach (Box 28). Stackable credentials enable students to communicate around job-relevant skills as they acquire them, to translate into immediate employment opportunities. Students who are unable to complete a degree program leave an institution with tangible value that they can communicate to a prospective employer. Lifelong learners can collect badges over time, building the credentials they are able to earn. Additionally, universities can better respond to changes in the workforce with more modular programming.

Box 28. Achievement and Flexibility through Stacking Credentials at Wichita State University

To enable flexible paths on the way to a degree, and credentials that can be immediately useful in the job market, Wichita State University (WSU) provides a for-credit program of stackable micro-credentials. The program includes 50 self-paced online courses, including instruction and videos, that students can enroll in at any point during the semester. Students earn digital badges for completing each course, worth credit hours from the accredited institution. WSU works with Credly, a digital credentialing company, to provide digital verification of the badge, allowing students to note the achievement and include it on their resumé or in their LinkedIn profile. Credits can then be scaffolded to earn relevant certificates, and they can be applied toward a degree.

Source: Geiszler-Jones 2017.

Stackable credentials are gaining popularity across the spectrum, from foundational skills through graduate-level programs, with MOOC providers, as well as with industry leaders. The University of Illinois, in collaboration with the MOOC provider Coursera, offers a stackable online MOOC-based Master of Computer Science in Data Science program. Students can first earn a specialization certificate in data mining or cloud computing and then choose whether to go on to finish the full degree. Digital badges are also gaining credibility within the market as a means for

upskilling. Salesforce.com and Google for example have created online curriculum for particular skills, which learners can engage with, complete, and embed live links to badges as they earn them, on LinkedIn or with resumés submitted to Indeed.com.

A blockchain-based transcript can create a permanent, detailed record of formal and informal learning that allows individual users to control what is included in their learning record and who may access that information. Such a transcript could include information about courses and degrees, certifications, badges and other micro-credentials, co-curricular activities, internships and employment, and other competencies and credentials. “Blockcerts” is an open standard for creating, issuing, viewing, and verifying blockchain-based records. Several higher education institutions are experimenting with blockchain-based credentials, including MIT. Central New Mexico Community College has begun using blockchain to issue student-owned digital diplomas, allowing students to manage and share their verifiable credentials.

Additionally, badging is gaining momentum for educator professional development. Some schools and districts are experimenting with systems designed to support micro-credentials; as an example, Kettle Moraine School District in Wisconsin provides educators with an increase in their base pay for every micro-credential they earn (Sturgis 2018). Other districts may offer stipends to teachers. Google, Apple, and Microsoft are among the organizations that offer badges that educators can display, communicating proficiency in STEM and education technology tools.

Strategies in action. Synthesizing best practices for creating a program with stackable badges, credits, and certificates can summarize how to put these strategies into action.

- **Determine content chunks and map credentialing pathways.** Create a series of badges and certificates that represent valuable knowledge acquisition and determine how these credentials can build for further certificates or degrees.
- **Ensure job relevance.** Work with employers to determine a set of badges and certificates that demonstrate value in the market.
- **Establish cross-institutional links.** Establish links through competencies across settings— from secondary education, through informal learning, through community colleges, and through universities.
- **Motivate educators with badges.** Determine a system of badges that can upskill educators on key topics around STEM and teaching with technology.

Establishing Higher Education and Industry Partnerships with Online Programs

To increase access to educational opportunities, as well as to strengthen the relevance of educational programs and align them with market needs, universities with online programs are partnering with private sector companies. For adult learners in the workforce, being able to work and learn flexibly is an essential part of unlocking economic opportunity. When Starbucks polled its U.S. employees about what they would want most of anything, they answered: “I’d want the chance to complete my higher education.” In 2014, 70,000 of the company’s 150,000 U.S. employees did not have university degrees (Young 2017). Box 29 demonstrates how two

universities with online programs have partnered with industry leaders to provide working adults with educational opportunities.

Box 29. Southern New Hampshire University's College for America and ASU: Teaming up with Employers to Provide Opportunities

The Southern New Hampshire University (SNHU) College for America partners with major employers, including McDonald's, Dunkin Donuts, and Aetna, to co-create and offer customized, accredited, competency-based degree programs. Over 120 organizations partner with SNHU to offer educational opportunities to their employees. Holiday Inn Club Vacations worked with College for America to design a competency-based associate's degree program, enabling a pathway to management within the company, which reimburses US\$2,000 of the US\$2,500 annual tuition fees.

Source: SNHU 2015.

Working with ASU, Starbucks put together the Starbucks College Achievement Plan (SCAP), allowing both employees with some college credits and those who had never set foot on a college campus to get a degree from ASU through the university's online program, with no out-of-pocket tuition costs. ASU discounts tuition by 42 percent, and Starbucks subsidizes the remainder of the tuition not covered by financial aid programs or grant funding. Employees can choose from over 80 bachelor's degrees, including degrees in sustainability, software engineering, educational studies, and organizational leadership. In 2017, Starbucks expanded the SCAP to include credits from ASU's Global Freshman Academy (GFA), enabling prospective learners who were previously ineligible to enroll in university courses a pathway to admission. Since its launch, the program has enrolled 9,000 learners to date and has expanded to the United Kingdom. The goal for Starbucks is to graduate 25,000 employees by 2025.

Source: starbucks.asu.edu.

In November 2018, Uber and ASU announced a partnership in alignment with the Starbucks model. Uber is offering tuition coverage for eligible drivers, as well as for family members. In addition to the 80 degree programs available, drivers can also earn certificates in English as a Second Language and Entrepreneurship.

Strategies in action. Synthesizing best practices for establishing university and industry partnerships can summarize how to put these strategies into action.

- **Reach adult learners through partnership.** Establish relationships with local and international employers to reach adult learners and their families with access to online education programs.
- **Develop an integrated labor market information system to connect employers with STEM/ICT talent.** Improve the recruiting process to connect students with prospective employers; an integrated platform can translate skills and certifications into employer needs and connect employers to qualified talent.
- **Guide curriculum with industry partners.** Create job-relevant degree and certificate program competencies aligned with market needs.

Increasing Access to Foundational Education Programs through Online Learning

Prohibitive cost, ineligibility, and stigma associated with returning to school are all blockers for adult learners who require foundational coursework. While 85 percent of students graduate from high school in the United States, and 70 percent of high school graduates enroll in college, only 60 percent graduate from college within six years (National Center for Education Statistics, n.d.);

8 percent of students in the bottom income quartile who start college will graduate. About 80 percent of jobs require some level of postsecondary training, accounting for 53 percent of the U.S. labor market; however, only 43 percent of the country's workers are trained to this 'middle skill' level (National Skills Coalition 2017). In South Africa, 40 percent of students who enter higher education institutions end up dropping out, and only 15 percent complete their degree in the minimum completion time. Lack of preparedness has been a primary learning-related cause of poor performance patterns in higher education, and key factors influencing student and institution preparedness include social and cultural capitals, cognitive skills, educational structure, and institutional culture (Fomunyam 2019). College preparedness, especially for underserved populations, is a complex, context-specific issue that global education systems and institutions have struggled to solve.

Foundational education, college readiness, or enabling programs that focus on diverse students from underserved populations, and with varying levels of incoming knowledge, can improve outcomes for these students. About 40 percent of Australians whose parents did not earn a college degree have earned one themselves, double the OECD average. For comparison, in the United States, only 14 percent of Americans whose parents did not earn a college degree have one themselves (Butrymowicz 2014). Enablement programs in Australia are considered by some to be an important initiative for successfully enrolling and retaining Australian students from underserved populations. These programs provide a pathway to university admission by providing foundational education in key areas, as well as in overall study skills and transition support. These programs cater to a wide range of students, including school leavers who lack prerequisite coursework, adult learners returning to studies after a long absence, and specific populations—including indigenous students, who comprise 2.5–3.0 percent of the Australian population. With a complex history of exclusion and dispossession, the government aims to bolster education initiatives to support this population. Over the past decade, there has been a 70 percent increase in the number of indigenous students in higher education and award courses, and an assumption is that this increase has largely been facilitated by enablement programs. Other estimates have noted that 70 percent of indigenous students gain entry to higher education through special entry programs, and that 50 percent of aboriginal and Torres Strait Islander students who gained entry to university did so through special entry programs. The findings of a study on the impact of enabling programs for indigenous students suggest further investment in these programs, demonstrating a link between participation in these programs and subsequent participation and retention in higher education programs—though long-term academic success measures for these students warrant further study (Pitman et al. 2017).

Competency-based, online programs enable universities to serve contemporary students with foundational education programs that meet their needs. Australian universities have scaled enablement programs through online education, outlined in Box 30. In the United States, WGU and ASU have each developed competency-based online programs that enable adult learners to engage with introductory-level courses at low or no cost, decreasing barriers for working adults to revisit obtaining a college degree (Box 31). It is important to note that increasing access to online enablement and readiness programs is an emerging area, and the success of these programs has not been determined.

Box 30. Enablement Programs at Open Universities Australia

Founded in 1993 as Open Learning Australia, and then expanded to Open Universities Australia (OUA) in 2004, OUA provides ODE to students across Australia, offering 290 degree programs in 1,570 subjects through 15 university partnerships. Through OUA, over 400,000 students have attained higher education qualifications at Australia’s leading universities, including University of New South Wales, University of Melbourne, and Australian National University (OUA, n.d.).

The Australian government has supported institutions in providing enabling programs to students who do not meet admission requirements, those who have not taken the Australia Tertiary Admission Rank (ATAR) exam or who have received low scores, and those returning to school after years in the workforce. Different funding schemes, including Commonwealth Supported Places (CSPs), increase access for students who need these programs.

OUA offers options for enabling programs, with FlexiTrack by Murdoch University and Uni Ready by Curtin University. Each program requires that students complete four courses that promote critical skills for university success, including study skills and time management; academic skills including reading, writing, and critical thinking; presentation skills; electronic information search and management; and persistence and commitment. With Uni Ready, students are required to take two core courses and can select two additional courses in areas of interest. Each course is 13 weeks long; students can take all four courses at one time, or they can space courses based on schedules and needs. Upon program completion, students can matriculate into Murdoch, Curtin, or other universities.

Figure 23. Enabling Courses at OUA

The screenshot displays the 'Enabling courses' section of the OUA website. It features a header with the title 'Enabling courses' and a sub-header 'Prepare for success at uni with sharp academic skills and a boost of confidence—and unlock a different pathway to your degree.' Below this, there is a paragraph explaining that deciding to take on higher education marks the beginning of an exciting study journey and that preparation is key to success. It further states that enabling courses are flexible study delivered in a supportive environment, specifically designed to meet the unique needs of students who are new to academic study. A final paragraph mentions that through engaging topics, interactive activities and assignments, students are introduced to the uni experience, developing study skills including reading and essay writing, and developing a winning attitude to see them through to the best outcome they're capable of.

The section is divided into two main parts: 'FlexiTrack by Murdoch University' and 'Uni Ready by Curtin University'. Each part contains a grid of course cards. Each card includes the university logo, the course name, the course code, and the number of related degrees. A red button labeled 'EXPLORE FLEXITRACK' is positioned between the two sections.

University	Course Name	Course Code	Related Degrees
Murdoch University	Learning Uni Style	MUR-EQU081-2019	1
	Knowledge in the Arts: Revealing Global Issues	MUR-EQU083-2019	1
	Knowledge in the Sciences: Tackling Global Challenges	MUR-EQU084-2019	1
	Knowledge in the Social Sciences: Understanding Social Change	MUR-EQU082-2019	1
Curtin University	Fundamentals of Academic Writing	CUR-UNR01-2019	1
	Foundations of Communication	CUR-UNR02-2019	1
	Applying Mathematics	CUR-UNR03-2019	1
	Introduction to Commerce	CUR-UNR05-2019	1

Source: OUA, n.d.

OUA offers two additional preparation track options: Foundations and OUA Pathways, as well as a self-paced English language test preparation course, offered through Macquaire University, for students who need to meet language prerequisite requirements. Foundation courses are offered by Unilearn, an organization formed in 1999 to help Australian students complete prerequisite coursework required for university programs. Unilearn’s online courses offered through OUA include Academic Literacy Skills, Biology, Chemistry, Economics, Senior Mathematics, Senior English, and Preparing to Study Online. Students can enroll in any number of courses, and they then have 12 months to complete each course. Most Australian universities accept the Unilearn coursework to meet prerequisite requirements. OUA Pathways are suggested introductory course loads for popular areas of study,

including Business, Business Management, Communications, Criminology, Education, Engineering, Health, Humanities, Science, and Social Science. Students are guided through suggested courses in each area that count toward degrees in those domains while getting a better understanding of the fields in which they are interested. If students decide to pursue a degree in a different area, the credits can apply toward those other degrees.

Box 31. Increasing Access to College Readiness Programs with ASU and WGU

ASU partnered with the MOOC provider edX in 2015 to launch the GFA, with a vision to give everyone access to America's most innovative school, regardless of their academic past. Students with incomplete high school transcripts or without college entrance exam scores from the SAT can complete a series of ASU courses offered through the GFA, which offers first-year college courses hosted on the edX platform for free. Students then pay for course credit. The GFA enables students to learn, explore, and complete ASU courses before applying or paying for credit, which reduces academic and monetary barriers while opening a new path to a college degree for many students. Students receive guidance from ASU support specialists to determine the number of online classes needed to become admissible to ASU and to maintain engagement and motivation. Most potential students take four to eight courses before demonstrating college readiness, depending on academic history (ASU - GFA, n.d.).

The GFA builds on ASU's innovation in both competency-based learning and online education. Through the GFA model, students can take as much time as they need to complete courses; they can retake courses if they do not pass. With earned admission, students who pass required credit hours with a 2.75 GPA or higher gain admission into ASU, and they can enroll in a degree with a portion of the program already complete.

Even with the incentive of true credit-bearing courses, the GFA has suffered from some of the same issues other MOOC providers have experienced around course completion and engagement. Enrollment has been high, but only a fraction of those exposed to material have gone on to complete courses and then receive credit from ASU for work in their field (Field 2019).

ASU is learning from its early GFA cohorts to improve engagement with student success coaches, who can help keep learners motivated and on track to complete their work. They are also seeking to focus on targeted marketing, reaching learners who aim to receive credit for their work and go on to full-degree programs.

At WGU, the average student age is 36, and more than 70 percent of students are part of at least one underserved population. To increase access to foundational subject matter for prospective and incoming students, WGU announced the WGU Academy Program in April 2019. In addition to college-level courses, the WGU Academy offers the Program for Academic and Career Advancement (PACA). Modeled on a nationally recognized social and emotional learning course used by WGU for several years, the course provides group sessions, peer interaction, and one-to-one coaching to build confidence and college persistence. In addition to supporting course engagement, these noncognitive competencies help prepare students for the learning demands of college. The WGU model also requires students to pay a monthly fee, rather than commit to a full term of tuition, to enroll in two or more college-level courses (WGU 2019).

Strategies in action. Synthesizing best practices for increasing access to foundational education programs can summarize how to put these strategies into action.

- **Decrease barriers to returning to school.** Provide access to competency-based coursework in fundamental subjects to build requisite knowledge—either through developing a program or in partnership with an existing program.
- **Provide life skills education.** Include lessons and strategies for success in pursuing education while working.
- **Provide mentorship.** Establish mentorship for students in remedial programs.
- **Improve links.** Improve links to secondary school and community colleges.

- **Integrate adaptive active learning into foundational programs.**

Implementing Competency-based Assessment

Demonstrating proficiency in competency-based programs is a critical consideration that must be an integral piece of competency-based program design. Online learning is a powerful enabler of competency-based education, providing more flexibility in course pacing while capturing data that can better measure knowledge acquisition and application. From micro-credentialing initiatives through foundational education programs, institutions have adopted competency-based assessment practices to align with course pedagogy. In programs at Northern Arizona University (NAU) Personalized Learning, SNHU College for America, and WGU, students subscribe to courses and can take as many assessments as they choose during their subscription period. Students with considerable prior learning through MOOCs or other programs can move quickly through assessments, while learners who need to spend more time on particular topics can target those areas (Klein-Collins 2013).

With competency-based assessment, the assessment process shifts from an emphasis on summative to an emphasis on formative assessments (Box 32). These assessments provide a meaningful learning experience for students while equipping educators with rich information to provide targeted support to students (Pearson Education 2016). Competency-based assessment can take a variety of formats, including objectively scored assessments (for example, those with multiple-choice or true-false questions), performance-based assessments (for example, those including essays, group projects, or simulated environments), and real-world observations (for example, by teachers in the classroom). Best practice research in designing competency-based assessment outlines that programs should

- Clearly define program competencies,
- Provide an explicit link between the skills measured by the assessments and those competencies,
- Demonstrate that student behaviors or thought processes during testing reflect the competencies,
- Relate performance on competency assessments with other measures of the same competencies, and
- Document the empirical relationship between assessment scores and future outcomes (such as success in the workplace or attainment of a more advanced competency) (McClarty and Gaertner 2015).

Box 32. Competency-based Assessment Best Practices

Higher education institutions with competency-based education programs demonstrate best practices in developing and implementing competency-based assessment across each step in the process:

Defining program competencies:

- WGU defines domains and subdomains for each competency-based degree. These subdomains outline the specific competencies that students must demonstrate. An example of an accounting subdomain would be that *the student understands the need for and uses of internal control systems*.
- Alverno College surveys faculty to capture critical learning outcomes for individual courses and academic departments. In addition to defining specific competencies for each course, the institution lists eight competencies required of all students—communication, analysis, problem solving, value in decision making, social interaction, development of a global perspective, effective citizenship, and aesthetic engagement. Each program defines specific, measurable descriptions for those competencies in the subject matter context.
- Lipscomb University licensed the Polaris business competency framework, which lists 41 competencies. Lipscomb received feedback from local business and industry stakeholders to focus on 17 of those competencies for its undergraduate degree and focuses on those competencies in its program.

Linking assessments with competencies: Southern New Hampshire University’s competency-based assessment includes authentic project tasks. Students select from multiple simple projects that assess one competency at a time or a single complex project that assesses multiple competencies. For example, a simple project can assess a student’s ability to write a paragraph about a recent purchase—specifically about the purpose of the item purchased and why it was selected over other items. A more complex project would involve writing a memo to a manager evaluating two vending machine companies and recommending one over the other. This project assesses five competencies: (1) using logic and reasoning to address a problem, (2) business writing for a memo (3) using a spreadsheet to perform calculations, (4) synthesizing material, and (5) critical evaluation of sources.

Build in formative assessment: ASU’s adaptive courseware captures data as students work through formative assessment throughout each course. The course building team ensures that assessment items align with the defined course competencies, and students engage with material until they can pass through associated formative assessment items. Information provided to instructors enables targeted intervention for struggling students.

Demonstrating that thought processes reflect the competencies: Excelsior College’s nursing program employs a computer-based exam to assess nursing theory, but critical thinking and clinical reasoning are measured through simulated clinical experiences and actual performance in a lab setting. The assessment rubric outlines how adequate or insufficient reasoning skills are demonstrated in these exercises.

Relate assessments and other measures of competency: The Iron Range Engineering bachelor’s in engineering program, a collaboration between Itasca Community College in Grand Rapids, MN, Minnesota State University, and the Iron Range industry in northeastern Minnesota, is centered on a three-part competency framework: technical skills, professional skills, and project management skills. Students work in industry during the program and develop projects that enable them to demonstrate the competencies required for the degree. The student must develop a portfolio that demonstrates each competency, serving as a self-assessment that requires students to articulate the learning outcomes and how they acquired them. Students must also take part in oral exams with faculty to discuss the portfolios and how they have met the competencies (Klein-Collins 2013).

Document the relationship between assessment scores and future outcomes:

- Lipscomb University students, who are employed as they engage with their competency-based program, are rated by their employers at the beginning and end of the program. These ratings can be correlated with assessment scores, providing evidence of the predictive value of these assessments.
- WGU reports that 94 percent of employers felt that graduates from its competency-based program performed at least as well as graduates from other institutions, while 53 percent of employers reported higher performance from WGU graduates.
- Graduates from Excelsior College’s competency-based nursing program pass the nursing licensure exam at rates comparable to the national average.

Source: McClarty and Gaertner 2015.

Strategies in action. Synthesizing best practices for implementing competency-based assessment can show how to put these strategies into action.

- **Define competencies.** Appoint a cross-functional team, including subject matter experts and employers, to define specific and measurable program competencies.
- **Link assessments with competencies.** Ensure that competencies are specifically measured through assessments; weight competencies measured by their importance in the program.
- **Demonstrate that student thought processes reflect the competencies.** Create rubrics that demonstrate how to measure that students understand specific competencies when evaluating an exam, project, or observation.
- **Relate assessments and other measures of competency.** Mix exams, observations, and projects aligned to program competencies. Authentic course projects can demonstrate student understanding, aligned to single or multiple competencies. Portfolios that students create can demonstrate understanding of each competency.
- **Document the relationship between assessment scores and future outcomes.** Create a system for collecting employer feedback for students who have participated in, or are currently enrolled in, competency-based programs.
- **Build in formative assessment as part of the full picture for student understanding of material.** Data captured as students work through formative assessment items can be considered in demonstrating student understanding of material; adaptive courseware easily captures this information to show student strengths and weaknesses while equipping instructors with data to target intervention.

4.2 Focus on Future-Ready Skills

Alongside technical skills, employers are emphasizing the importance of creativity, collaboration, communication, and critical thinking—known as the 4Cs of 21st century skills—as well as computational thinking. Over half of people in leadership positions surveyed prioritized the value of personal, social, and communication skills over technical skills, and creativity was listed as the top in-demand soft skill in LinkedIn’s 2019 Global Talent report, with persuasion, communication, adaptability, and time management rounding out the top five list (Lewis, 2019). Computers are increasingly able to perform higher-level tasks, and process-driven jobs are therefore becoming more of a commodity. People who can think of creative—better, relevant, novel solutions—will continue to be in demand, while developing and implementing new solutions involves strong collaboration and communication skills; computers can’t replicate these skills.

Social and Emotional Learning and Computational Thinking

Social and emotional learning (SEL) is also increasingly relevant for this reason, with competencies around self-awareness, social awareness, relationship skills, responsible decision-making, and self-management (CASEL, n.d.). While much of the focus on developing these skills has been in primary and secondary education, schools are experiencing strong results; students

who participate in SEL programs show an 11 percent point gain in academic achievement, and studies show decreased dropout rates, school and classroom behavior issues, drug use, teen pregnancy, mental health problems, and criminal behavior. Studies have shown that every dollar invested in SEL programs results in an 11 dollar return on investment (CASEL, n.d.).

Figure 24. Social and Emotional Learning Competencies



Source: (CASEL, n.d.)

In an increasingly digital world and workplace, Computational Thinking (CT) is of critical importance—across occupations. Rather than fact-based learning, CT requires deeper thinking, as learners are taught to think as if they are computers to decompose problems, recognize patterns, abstract information, and come up with an algorithm, or process, to complete a task. As computers are increasingly able to easily and instantaneously provide fact-based information, people who are not taught to think computationally will be dependent on machines to perform daily tasks, with limited prospects for employment. At the primary and secondary levels, England, Finland, South Korea, and Australia require that students learn Computational Thinking, and several U.S. states have similar requirements, integrating CT across the curriculum. While research highlights that it’s important to introduce CT early, in elementary or even preschool education, introducing CT in adult education, including for teachers, is valuable.

Skills That Support Automation: Cloud Computing, Blockchain, and Artificial Intelligence

Skills that support automation, including in the areas of cloud computing, Internet of Things (IoT), blockchain, and artificial intelligence, will be increasingly in demand. Cloud computing was the number one most in-demand hard skill of 2019 globally, according to LinkedIn, reflecting massive adoption of cloud computing across industries (Lewis, 2019). “For African markets, cloud, virtualization, and the broader evolution towards serverless computing are the most disruptive technology developments since the advent of the mobile payment revolution. Few other segments in the African ICT space are as likely to generate an incremental \$2bn in top line revenue over the next five years, and at least as much in adjacent enabling ecosystem revenue” (Research and

Markets - Press Release, 2019). Cloud computing is an important enabler, across mobile use, IoT more broadly, big data, and more. However, in 2017, 41 percent of organizations lacked the skills to properly manage cloud deployments, and in a 2018 survey, 42 percent of government and education institutions cited cloud expertise as one of their most pressing skills shortages (Wong, 2019). Cloud computing has taken off dramatically across Africa's major markets; in 2013, fewer than 50 percent of African companies surveyed used cloud computing, but by 2017, the majority of companies surveyed in South Africa, Kenya and Nigeria had increased their spend on the cloud. In Kenya, 90.4 percent of the surveyed companies had increased their cloud spend in 2017, and 98 percent of Kenyan companies interviewed looked to increase their spend on cloud computing in 2018 (Brown, 2018). While not as widespread, the global demand for blockchain engineers grew 517 percent between 2017 and 2018, according to a study by recruitment company Hired (Hired, 2019).

Reflecting these trends, in 2018 President Uhuru Kenyatta called on the Ministry of ICT to create a taskforce that will focus on how the country can leverage on blockchain and IoT technologies across industries, including agriculture and financial services (president.go.ke, 2018). Higher education institutions in Kenya, both at the TVET and university levels, can establish successful models for educating learners in these domains. Select leading institutions can build expertise and demonstrate university-industry partnerships, to then scale best practices more broadly across tertiary education. Considering which universities would lead development of innovative courses in cloud computing, IoT, blockchain, and artificial intelligence is a discussion point for the government, as is considering which industry partners would support development of these programs.

Higher education institutions are increasingly adopting cloud computing. Cloud-based software applications (including email and document sharing) are now widely used in higher education. Cloud infrastructure and platform services are also increasingly deployed in the sector, though expertise and up-front investment remain as blockers for adoption. Use cases range from cloud-integrated financial aid systems and student enrollment systems, through cloud platform support for machine learning as part of research initiatives. For example, researchers at Northeastern University used mathematical and computational approaches powered by Google Cloud Platform (GCP) to simulate the spread of Zika in 2016 to help public authorities better understand the disease's evolution and trajectory. The team churned through hundreds of terabytes of data stored in the cloud, enabling the team to move quickly at scale. Cloud platform deployments for use in higher education infrastructure, business intelligence, and research can serve as a follow-up discussion point.

Given the current demand for cloud computing skills, expected growth in the industry, and access to low-cost cloud computing resources, innovative universities and TVET centers can work with major cloud providers to develop relevant cloud curriculum. This curriculum could be implemented with a select group of students and then launched more broadly across other education institutions, as well as through an online course through the Open University of Kenya. Reflecting the increasing demand for cloud development and current skill gap, major cloud providers Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP), IBM, and Alibaba are driving cloud education initiatives. Each organization offers cloud certification and education programs for students, with some level of free content for students to

get started learning and developing on the respective platform. The major cloud providers are also teaming up with universities to offer cloud training. In 2019, Amazon announced a partnership with LaGuardia Community College (LAGCC), the City University of New York (CUNY), and the State University of New York (SUNY) to create a cloud computing certificate program for students across the state to get students ready for entry-level tech roles at Amazon or elsewhere. The program will be offered to tens of thousands of students across these universities. Currently, Amazon's Educate program is used by over 1,500 institutions to train students in cloud computing. The program includes curriculum development workshops and AWS trainings for faculty, while students receive free AWS Promotional Credits in order to perform their project assignments. Another feature of the program is a job board that allows students to upload resumes, receive job alerts, connect with recruiters, and search for cloud computing jobs and internships at Amazon and other tech companies (Perez, 2019).

Two key ways higher education institutions are engaging with blockchain are through curriculum and credentialing. In 2018, distributed-ledger currency exchange company Ripple launched a multi-million dollar initiative focused on blockchain technology research, organizational activities, and curriculum development. Twelve academic institutions worldwide are participating, including Stanford University, University College London, Korea University, the University of Luxembourg, and the Delft University of Technology in the Netherlands.

Universities globally are advancing innovative blockchain curriculum for students. Massachusetts Institute of Technology (MIT) currently offers an online, self-paced course called Blockchain Technologies: Business Innovation and Application. Columbia University and IBM have established a partnership to develop blockchain technologies through an incubator open to faculty and students at Columbia, as well as to the broader startup community. Programs such as Howard University's Blockchain Lab -- in partnership with Consensus -- afford students the opportunity to connect with professionals and drive awareness of the growing field. In 2017, Carnegie Mellon University (CMU) in Rwanda became the first university in Africa to offer education on blockchain, bitcoin, and cryptocurrency, in a mini 6-week introductory course (Tkacik, 2018).

To prepare students for careers in Artificial Intelligence, programs in data science, data engineering, and data analysis are all in demand; job titles in these areas include "data scientist," "machine learning engineer," "predictive modeler," "analytics manager," "computer vision engineer," "computational linguist," and "information strategy manager." Coding bootcamp providers are increasingly adding data science offerings, and master's programs in artificial intelligence domains are growing. The University of Nairobi and Strathmore University, which displays offerings around machine learning in on its e-learning course website (Strathmore, n.d.), can play a leading role in establishing programs in data science and machine learning, potentially in collaboration with coding education companies including Moringa School or Andela.

Box 33. Moringa School's Coding and Data Science Education Program

Named one of the “Top 10 Most Innovative Companies” in 2018 by Fast Company, Nairobi-based Moringa School provides young Africans with digital and professional skills training. Moringa School has placed more than 95 percent of its graduates into leading companies, both in Africa and globally (Youth Impact Labs, 2019).

For Software Development, Moringa offers a 5-week introductory course known as “Moringa Prep” and a 15-week advanced intensive course called “Moringa Core.” Moringa Prep focuses on the fundamentals of programming and a base of front-end skills. Moringa Core enables different tracks, including full-stack development and mobile development. For Data Science, Moringa Prep offers a day-long “Data Science Master Class” and a 5-month “Data Science Full-time Class.” The Master Class provides in-depth knowledge and practical skills around fundamentals of basic concepts including datasets and machine learning. The Full-time class gets students on the pathway to becoming professional Data Scientists. The courses run from \$80 USD for the Master Class through \$1,600 USD for Moringa Core and the Data Science Full-time Class.

Moringa School uses a blended learning model, with online and face-to-face learning and a self-paced program. The model also emphasizes real-world, project-based learning and paired programming.

Moringa has trained 1,860 students from Kenya, Rwanda, Pakistan, Ghana, Hong Kong, and Uganda.

Source: (Moringa School Website, n.d.)

4.3 Higher Education Technology Use in Kenya: Strategies in Action

Considering how other higher education institutions have used technology to address key issues provides strategies and models that can be adapted for higher education in Kenya. The education sector in Kenya is positioned to meet challenges around educating young people and preparing them for the workforce through the implementation of the National Education Sector Strategic Plan (NESSP). The measures to enact change laid out in the NESSP can be aligned with strategies and models for technology use from other institutions.

While this report distills strategies based on good practices from other systems, it does not provide specific implementation guidance. A recommended next step for the government is to discuss each strategy in context, including considering the following discussion points (Table 22):

- Which strategies are practical for Kenya, and how could each strategy be achieved in the Kenyan context?
- What role could the government play in implementing each strategy?
- Which universities, TVET centers, and ACE programs would be the right partners for launching initiatives?
- How can the government support scaling initiatives?
- What industry partnerships can be formed to support strategies?
- How can the government support new ways for students to demonstrate skill acquisition for IT skills and 21st century skills, beyond summative examinations?

- Given how crucial developing instructional design and digital course development expertise is, how can the government establish centralized expertise? Would creating a centralized team at the national level be an option, to then support universities, TVET centers, and ACE programs in building and implementing digital initiatives?
- How can the government support an ecosystem of partners with digital course development expertise?
- How can the government establish and maintain a mentorship framework and intelligent support systems with institutions?
- What role can the government play in creating an integrated solution to connect students to employers?

Table 24. Strategies in Action: Considerations for Kenya

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>Strategy 3.1. Building online programs - overall best practices</p> <p>NESSP priorities and programs:</p> <p>All - Building strong online education programs is a foundation for today’s quality, relevant, and inclusive education.</p>	<p>Recruit innovative leadership. For the OUK, the country can invest in a visionary leader that will drive a culture of innovation. It is also important to invest in tertiary education leadership overall, at other universities, as well as at TVET programs and ACE centers. A group of leaders across these institutions can collaborate for an integrated approach to achieve Kenya’s NESSP priorities.</p>
	<p>Share knowledge with external partners. Kenya should share knowledge with ASU and other higher education institutions, including those highlighted in this document, that have extensive online course development and implementation experience.</p>
	<p>Centralize operations. The OUK, other universities, and the 47 TVET Centers of Excellence (or other TVET entities) being created can establish centralized teams with cross-functional expertise. As with EdPlus at ASU, this team should include leadership, instructional designers, and technologists, as well as marketing and student success mentors, with access to subject matter experts, educators, graphic designers, and video producers. The team should also include a practical research group that can put learnings into action. The ‘master course’ model ASU employs can be adapted to build quality, scalable courses. This centralized course development model applies across all of the suggestions in this chart. <i>Specific NESSP links: Strengthen devolved and decentralized education structures; Improve human resource management in the education sector.</i></p>
	<p>Build instructional design competencies. Kenya can invest in building competencies around instructional design and ensure that instructional designers are embedded in institutions. With instructional design expertise, course design teams will ensure that online courses are dynamic and interactive versus online versions of face-to-face or even static digital experiences. <i>Specific NESSP link: Build human resource capacity development for public universities.</i></p>

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
	<p>Invest in Internet infrastructure. Kenya can continue to build on its Kenya Education Network Trust (KENET) progress by investing in Internet access at all tertiary education institutions—focusing on the last mile. Kenya can also establish centers where people without Internet access at home can access high-speed Internet to complete online coursework—potentially through the ACE network—and the 300 new ACE centers to be established, as well as the 300 Community Learning Resource Centers (CLRCs).</p>
	<p>Create mobile-friendly content. With the ubiquity of mobile devices in Kenya, enabling learning on mobile devices meets students where they are. Instructional designers and technologists can help create mobile-optimized content.</p>
	<p>Provide sustainable professional development. To build instructor competencies, Kenya can employ a ‘train-the-trainer’ and mentorship model, where the small committees involved in course creation can train a set of instructors, who can then train other instructors as the program scales. Instructors who are new to teaching online can be assigned mentors who have taught in previous semesters. Instructional designers can create online and blended courses on how to teach online. <i>Specific NESSP link: Build human resource capacity development for public universities.</i></p>
	<p>Develop knowledge-sharing portals. The education sector can support knowledge sharing with informational web portals for universities, TVET programs, and ACE centers—for instructors and all stakeholders involved in building and delivering programs.</p> <p>Additionally, the hub network can be leveraged to share information and best practices from C4DLab and the new Strathmore hub, for universities to further adopt the hub model.</p>
	<p>3.1.2. Market with MOOCs. The OUK can explore the MOOC model of offering free content as a funnel for reaching learners and converting them into university students. The development team can ensure that a model for student motivation is in place, including offering credit for course completion and providing enrollment support to help guide students to a credit-bearing path.</p>
	<p>3.1.3. Assess vendor partnerships. The OUK and other online degree programs at universities can seek external vendors—services provided by OPMs—to supplement capacities in the form of instructional design expertise, resource development, technology platform development, back-end enrollment services, course marketing, and retention/mentorship services. If Kenyan institutions seek to partner with OPMs, their teams will be clear on what the needs are and assess advantageous business models for their programs.</p> <p>The government can determine the role it can play in catalyzing a course development and support ecosystem.</p>

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>Strategy 3.2. Providing Mentorship to Online Students</p> <p>NESSP priorities and programs:</p> <p>Improve retention, well-being, and productivity of university students</p> <p>Provide mentorship, guidance, and counselling</p> <p>Enhance life skills and values in education and training</p>	<p>Invest resources in online student mentorship. To support student retention, Kenya can learn from the successes ASU and WGU have experienced with ‘success coaches’ and mentors for online students. Programs can match students with relatable mentors; research indicates that female mentorship for young women can boost female participation in STEM.</p>
	<p>Use data to guide students and consider AI systems. Kenya can invest in a data system that equips mentors with information on student attendance and performance. The data system can include predictive analytics, using data to flag at-risk students as at the Open University , GSU, and AOU.</p>
	<p>Provide mentorship to students to scale limited IT expertise. Through hubs and using technology that could provide a one-to-many relationship between mentors and mentees, IT professionals can share their knowledge with students. Hubs and incubation centers, including the C4DLab at the University of Nairobi, can be further leveraged to connect mentors with students earlier in the pipeline to inspire them to engage with STEM careers. These hubs can make use of virtual tools to extend their programs to rural areas.</p>
	<p>Engage with students through mobile devices. With the popularity of mobile communication, especially among young people in Kenya, mentors can engage with students through text messages. An automated system for sending students alerts and notifications can also be established.</p>
<p>Strategy 3.3. Decreasing Course Material Costs with OER content</p> <p>NESSP priorities and programs:</p> <p>Enhance equity and inclusion</p> <p>Increase access and participation in TVET</p> <p>Expand learning opportunities in ACE</p> <p>Review curriculum and program delivery</p>	<p>Develop an OER content strategy. For course content with the OUK, as well as with ACE, TVET programs, and other university courses, Kenya can achieve increased access by decreasing cost, using OER content, including OER textbooks and YouTube content.</p>
	<p>Build a collaborative team to create a dynamic experience around OER content. As at NOUN, Kenyan institutions can invest in a cross-functional team, including instructional designers and technologists to ensure a strong student experience and smooth delivery through the chosen LMS.</p>
	<p>Cultivate OER community in Kenya. As with the U.S. portal, the CCCOER, Kenya can establish a community platform around using OER and sharing best practices. Kenya can also share knowledge with the CCCOER community in the United States to learn about their approach and growth.</p>
	<p>Ensure quality of OER materials. In creating and vetting OER content, institutions can implement a quality assurance framework, including a rubric for assessing content and a peer review process.</p>
<p>Develop robust course experiences with OER content. As part of the course creation process, a team of instructors can embed active learning elements—including discussion topics and group exercises—either for blended learning or for fully online sections. Kenya can consider an approach that uses OER content as part of an adaptive course design process.</p>	

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>Strategy 3.4. Implementing Adaptive Active Learning</p> <p>NESSP priorities and programs:</p> <p>Enhance equity and inclusion in university education</p> <p>Improve quality and relevance of ACE - including accelerated curricula</p> <p>Improve quality and relevance of TVET training in Kenya</p> <p>Improve retention, well-being, and productivity of university students</p> <p>Review curriculum and program delivery in universities</p>	<p>Set a vision for adaptive learning. Institutions should set a vision and purpose for building adaptive courses, including subject matter and desired outcomes. Target courses may include large foundational courses in basic education, across ACE, TVET, and university programs, given the urgency and potential for cost savings.</p>
	<p>Include active learning. To help with instructor preparation, centralized course development teams can provide a pool of active learning exercises for instructors to share.</p>
	<p>Redesign learning spaces. Bricks-and-mortar universities, TVET centers, and the 300 new ACE centers (and 300 CLRCs) can redesign learning spaces to facilitate active learning in groups. <i>Specific NESSP link: Expand infrastructure in all public universities.</i></p>
	<p>Active learning in online courses. Adaptive online courses can include discussion threads, peer-to-peer feedback, reflection exercises, and virtual group projects to ensure an active learning component. Departments can also select adaptive courseware that includes active learning, especially in courses with a lab component.</p>
	<p>Provide ongoing training on data-driven instruction. Institutions should provide training before each term, and they can pair new instructors with mentors. Part of this training includes using dashboard analytics to target struggling students and to focus on remediating in specific topic areas, as well as implementing active learning in a flipped classroom.</p>
	<p>Knowledge sharing. Kenya can share knowledge with ASU and other institutions with success in adaptive learning to design and implement an adaptive learning program.</p>
<p>Strategy 3.5. Providing Practical STEM Skills: Coding Bootcamps</p> <p>NESSP priorities and programs:</p> <p>Strengthen STEM education</p> <p>Increase access to Science, Technologies and Innovation (ST&I)</p> <p>Promote collaborations and links in ST&I</p>	<p>Implement coding education programs. Kenya can promote partnerships between universities and TVET centers and coding education providers, including Andela and Moringa School, with several options for the partnership model—including offering boot camps for credit and enabling graduates to upskill with boot camps and connect with employers.</p>
	<p>Build 21st century skills and computational thinking skills. As students acquire technology skills, it is important for institutions to foster other critical skills for the workforce, including critical thinking, creativity, problem solving, collaboration, and critical thinking. These skills can be part of active learning in a well-rounded coding education program. The Nairobi Design Thinking School (NDTS) can extend its resources to help develop quality programs in these areas.</p>
	<p>Establish standards for coding programs. Kenya can work with industry partners and hubs—including iHub, Fablab, and C4D Lab—to establish a set of evaluation standards for coding boot camps.</p>

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>Enhance access to education and training qualifications for Kenya National Qualifications Framework (KNQF)</p> <p>Improve quality and relevance of TVET training</p> <p>Improve TVET industry link</p> <p>Increase access to STEM programs</p>	<p>Equip educators with digital skills. Primary, secondary, and tertiary school educators can also go through these coding boot camps for longer-term sustainability across the pipeline. Initiatives like the C4DLab’s Problem-Based Learning Program for Educators can be extended through trainings and online modules to provide educators with practical tips for teaching STEM in the classroom. <i>Specific NESSP link: All programs around building teacher competency throughout primary, secondary, and tertiary education.</i></p> <p>Support upskilling and hiring initiatives with funding programs. Kenya can establish policies that enable students who receive financial assistance to access vetted, quality coding education programs as with the EQUIP program in the United States; Kenya can also develop grant initiatives that can fuel communities/hubs to improve the hiring process in partnership, as with TechHire in the United States. Additionally, Kenya can explore new financing models for students to pursue rapid-growth fields.</p> <p>Collaborate with leading universities, TVET programs, coding education providers, and industry partners to create initial programs in cloud computing, Internet of Things (IoT), AI, and blockchain technologies. OUK, University of Nairobi, Strathmore, and leading TVET centers may be good launch partners for these programs, in partnership with Moringa School and Andela, as well as hubs, and industry partners including Microsoft, Google, IBM, and Amazon.</p>
<p>Strategy 3.6.1. Upskilling with Micro-credentialing</p> <p>NESSP priorities and programs:</p> <p>Improve institutional links</p> <p>Strengthen STEM education</p> <p>Enhance access to education and training qualifications for Kenya National Qualifications Framework (KNQF)</p> <p>Develop national regulatory assurance system</p> <p>Develop TVET Accreditation and QA</p>	<p>Outline modular credentials with value. Kenya can look to the WSU model of stackable credentials to create a series of badges and certificates that students can earn on the way to a bachelor’s or master’s degree. Developing QA standards would be a critical component of this initiative.</p> <p>Build job-relevant skills. Kenya can work with employers to determine a set of badges and certificates that would serve as a standard for ACE programs, TVET centers, universities, and other online courses including MOOCs.</p> <p>Implement a competency-based system. Established links across the system (ACE, TVET, university, and industry) could enable a full competency-based approach.</p> <p>Motivate educators. As with K-12 and higher education in the United States, Kenya can employ an upskilling initiative with its educators, in primary through higher education. Badges can align with initiatives in the NESSP, including competency-based curriculum and integrating STEM into the classroom. <i>Specific NESSP link: All programs around building teacher competency throughout primary, secondary, and tertiary education.</i></p>
<p>Strategy 3.6.2. Establishing Higher Education and Industry Partnerships</p> <p>NESSP priorities and programs:</p>	<p>Reach adult learners through partnership. Institutions can partner with multinational and local industry partners to reach adult learners and their families with access to online education programs. Industry partners can help fund the cost of educational attainment for their employees, as with the ASU and Starbucks/ASU and Uber partnerships and with SNHU’s College for America program.</p>

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>Increase access to ST&I</p> <p>Promote collaborations and links in ST&I</p> <p>Enhance life skills and values in education and training</p> <p>Improve TVET industry link</p> <p>Expand learning opportunities in ACE</p>	<p>Develop an integrated labor market information system to connect employers with ICT talent. Improving the recruiting pipeline can be an effective path to increasing employment. A platform for translating skills and certifications into employer needs and connecting employers to qualified talent would streamline the process.</p>
	<p>Leverage the global business processing outsourcing (BPO) ecosystem to connect learners with paid real-world opportunities. The ability for learners to acquire skills, earn money, and provide value can be a path for gaining expertise before seeking employment. Higher education institutions could potentially play a role in connecting students with opportunities on sites like Upwork and freelancer.com and recognizing this real-world experience. It is important to caveat that leveraging the BPO ecosystem is not presented as a core strategy, as it is not a sustainable solution—but rather as a possibility to supplement education and training through practical, paid, real-world experience.</p>
	<p>Cocreate curriculum and certifications with industry partners. Universities and TVET programs can work with industry partners for curriculum guidance, to ensure that degree and certificate program competencies align with job market needs. As with SNHU’s partnership with Holiday Inn, custom badges or certificates can be developed as a recruitment pipeline or for upskilling employees.</p>
	<p>Consider sectors with IT demand and most in-demand roles to adapt STEM curriculum and recruiting efforts. Institutions can develop context-specific projects to support job readiness in the top sectors in Kenya: technology, consultancy, banking, finance and insurance, and telecommunications, as well as health care, education, agriculture, energy, and transportation and logistics. Programs should focus on IT, software development, and data science, as well as more advanced topics to prepare for future skills, including cloud computing, blockchain, IoT, and AI.</p>
<p>Strategy 3.6.3. Increasing Access to Foundational Education Programs</p> <p>NESSP priorities and programs:</p> <p>Expand learning opportunities in ACE</p> <p>Improve quality and relevance of ACE - including accelerated curricula</p>	<p>Develop online foundational skills programs. Kenya can provide access to and promote a low-cost or free competency-based self-paced course in fundamental math and literacy that builds requisite knowledge.</p>
	<p>Provide life skills education. ACE programs, TVET centers, and universities can include curriculum around life skills; strategies for learning; and balancing work, family, and educational priorities. <i>Specific NESSP link: Enhance life skills and values in education and training.</i></p> <p>Build an advocacy campaign. The Kenya team can work on an advocacy campaign and share knowledge with ASU, WGU, and U.S. community college systems about how to decrease the stigma associated with foundational education. <i>Specific NESSP link: Advocacy and publicity of ACE programs</i></p>
<p>Strategy 3.6.4. Implementing Competency-based Assessment</p>	<p>Define program competencies. Universities and TVET programs should appoint cross-functional teams, including subject matter experts in collaboration with employers, to define specific and measurable course competencies.</p>

Strategy and Aligned NESSP Priorities	Strategy in Action: Considerations for Kenya
<p>NESSP priorities and programs:</p> <p>Review curriculum and program delivery in universities</p> <p>Improve quality and relevance of ACE - including accelerated curricula</p> <p>Improve TVET industry link</p>	<p>Align competencies with a mix of assessment measures. A mix of assessment measures, including exams, projects, and observations, should be created in alignment with the program competencies. Authentic course projects can measure single or multiple competencies, and student portfolios can be a form of assessment to demonstrate understanding of each competency. Rubrics should be developed to show how to assess whether students fully, partially, or insufficiently grasp material.</p>
	<p>Capture and consider student thought process. Student thought processes should demonstrate their understanding of course material, assessment measures can capture thought processes, and rubrics can outline how to consider this information in evaluating student understanding of material.</p>
	<p>Seek feedback from employers. Universities and TVET centers can seek feedback from local employers to help validate competency-based assessment measures.</p>
	<p>Use courseware that includes formative assessment measures. Adaptive courseware embeds formative assessment, provides targeted material to fill in knowledge gaps, and highlights information on student strengths and weaknesses to help tailor intervention with students.</p>

5. Conclusion

Today, the Kenyan government's main challenge in higher education is to find a financially sustainable way of expanding access, improving the quality and relevance of the programs offered, and strengthening university-based research and technology transfer. The financing scenarios elaborated in the context of this report indicate clearly that the Government of Kenya needs to pay careful attention to the elaboration of a sustainable financing strategy for the development of higher education in Kenya, which can be guided by a few key principles.

- Plan the shape and institutional configuration of the higher education system, bearing in mind that this determines, to a large extent, the cost of building, operating, and strengthening tertiary education institutions.
- Mobilize sufficient resources, public and private, to meet the needs for quantitative expansion and quality improvement on an equitable basis.
- Rely on funding mechanisms that are performance-based and, when appropriate, allocated in a competitive manner.
- Ensure full compatibility among the various funding instruments used.
- Offer transparency in the design and operation of all funding mechanisms (policy objectives sought and rules and procedures for resource allocation).

Naturally, financing reform is not an end in itself. It is a priority only insofar as it serves the purpose of ensuring funding sustainability with the three complementary goals of expanding higher education opportunities in an equitable manner, improving the quality and relevance of the programs offered, and strengthening the country's research capacity. Any financing reform therefore needs to be an integral part of Kenya's Vision 2030 and support its ambitions for the future of higher education and a meaningful contribution to economic and social development and the achievement of the Sustainable Development Goals.

Improving the quality and relevance of Kenyan higher education institutions will require a combination of interventions:

- (a) Better preparation of incoming students
- (b) Enhanced qualification of academics
- (c) Innovative curricular and pedagogical practices
- (d) Closer links to employers
- (e) Increased internationalization

Finally, Kenyan higher education institutions can follow the example of innovative universities in other parts of the world, which have demonstrated good practices in building, implementing, and scaling up digital programs, addressing challenges similar to those faced by the Kenyan higher

education system. Examining how these institutions have implemented such strategies and models can provide useful lessons that Kenya can learn from to deliver its priorities and programs. The five core initiatives for the government to consider in that respect are

- (a) Investing in expertise in online course development;
- (b) Developing student support structures;
- (c) Innovating in program design through the use of OER;
- (d) Innovating in program delivery by leveraging online learning to serve working adults; and
- (e) Providing practical ICT skills education through partnerships with coding education providers, hubs, and industry leaders.

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Annex 1: Summary of Results under Scenario 1

	2017	2018	2020	2022	2024	2026	2028	2030
Student Enrollment - Scenario 1	539,748	554,390	583,904	613,624	643,424	673,171	703,116	734,394
Public	461,819	474,347	499,600	525,029	550,526	575,978	601,600	628,362
Private	77,929	80,043	84,304	88,595	92,898	97,193	101,516	106,032
% Public	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6
Student enrollment in long courses - Scenario 1								
Sciences	187,365	192,448	202,693	213,010	223,355	233,681	244,076	254,933
Arts and Humanities	295,530	303,547	319,707	335,980	352,296	368,583	384,979	402,105
Lecturers in Public Institutions - Scenario 1	13,654	16,391	17,264	18,142	19,023	19,903	20,788	21,713
With PhD	4,713	7,450	8,323	9,201	10,082	10,962	11,847	12,772
Without PhD	8,941	8,941	8,941	8,941	8,941	8,941	8,941	8,941
% with PhD	34.5	45.5	48.2	50.7	53.0	55.1	57.0	58.8
% without PhD	65.5	54.5	51.8	49.3	47.0	44.9	43.0	41.2
Additional lecturers required	0	3,147	942	971	998	1,023	1,058	1,105
Lecturers in Private Institutions - Scenario 1	4,242	4,357	4,589	4,823	5,057	5,291	5,526	5,772
With PhD	1,229	1,344	1,576	1,810	2,044	2,278	2,513	2,759
Without PhD	3,013	3,013	3,013	3,013	3,013	3,013	3,013	3,013
% with PhD	29.0	30.8	34.3	37.5	40.4	43.0	45.5	47.8
% without PhD	71.0	69.2	65.7	62.5	59.6	57.0	54.5	52.2
Additional lecturers required	0	242	250	258	265	272	281	294

Annex 2: Summary of Results under Scenario 2

	2017	2018	2020	2022	2024	2026	2028	2030
Student Enrollment - Scenario 2	539,748	570,747	635,588	704,149	776,313	851,927	910,570	951,075
Public	461,819	488,343	543,822	602,484	664,229	728,926	779,101	813,759
Private	77,929	82,405	91,766	101,665	112,084	123,002	131,468	137,317
% Public	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6
Student enrollment in long courses - Scenario 2								
Sciences	187,365	198,141	220,686	244,529	269,631	295,940	316,335	330,407
Arts and Humanities	295,530	312,526	348,080	385,683	425,271	466,759	498,924	521,119
Lecturers in Public Institutions - Scenario 2	13,654	16,875	18,792	20,819	22,952	25,188	26,922	28,119
With PhD	4,713	8,381	11,126	13,900	16,708	19,553	21,836	23,529
Without PhD	8,941	8,494	7,666	6,918	6,244	5,635	5,086	4,590
% with PhD	34.5	49.7	59.2	66.8	72.8	77.6	81.1	83.7
% without PhD	65.5	50.3	40.8	33.2	27.2	22.4	18.9	16.3
Additional lecturers required	0	3,630	1,507	1,621	1,736	1,852	1,370	1,431
Lecturers in Private Institutions - Scenario 2	4,242	4,486	4,995	5,534	6,101	6,695	7,156	7,475
With PhD	1,229	1,623	2,412	3,203	3,997	4,797	5,443	5,928
Without PhD	3,013	2,862	2,583	2,331	2,104	1,899	1,714	1,547
% with PhD	29.0	36.2	48.3	57.9	65.5	71.6	76.1	79.3
% without PhD	71.0	63.8	51.7	42.1	34.5	28.4	23.9	20.7
Additional lecturers required	0	371	401	431	461	492	364	380

Annex 3: Summary of Results under Scenario 3

	2017	2018	2020	2022	2024	2026	2028	2030
Student Enrollment - Scenario 3	539,748	561,175	605,341	651,171	698,542	747,313	789,160	824,265
Public	461,819	474,225	498,761	522,766	546,040	568,377	591,870	618,199
Private	77,929	86,950	106,580	128,404	152,502	178,935	197,290	206,066
% Public	85.6	84.5	82.4	80.3	78.2	76.1	75.0	75.0
Student enrollment in long courses - Scenario 3								
Sciences	187,365	199,818	226,889	257,043	290,518	327,553	355,122	370,919
Arts and Humanities	295,530	302,378	315,235	326,732	336,563	344,406	355,122	370,919
Lecturers in Public Institutions - Scenario 3	13,654	12,293	13,601	15,037	16,618	18,363	19,729	20,607
With PhD	4,713	4,246	7,083	9,757	12,341	14,899	16,923	18,334
Without PhD	8,941	8,047	6,518	5,280	4,276	3,464	2,806	2,273
% with PhD	34.5	34.5	52.1	64.9	74.3	81.1	85.8	89.0
% without PhD	65.5	65.5	47.9	35.1	25.7	18.9	14.2	11.0
Additional lecturers required	0	0	1,057	1,164	1,284	1,419	1,004	1,048
Lecturers in Private Institutions - Scenario 3	4,242	4,733	5,802	6,990	8,301	9,740	10,739	11,217
With PhD	1,229	2,021	3,605	5,210	6,860	8,573	9,794	10,451
Without PhD	3,013	2,712	2,196	1,779	1,441	1,167	946	766
% with PhD	29.0	42.7	62.1	74.5	82.6	88.0	91.2	93.2
% without PhD	71.0	57.3	37.9	25.5	17.4	12.0	8.8	6.8
Additional lecturers required	0	618	706	801	900	1,006	546	571

Annex 4: Resource Diversification Matrix

Category of income	Source of income				
	Government	Students and families	Industry and services	Alumni/philanthropists	International cooperation
Budgetary contribution					
General budget	X				
Dedicated taxes (lottery, tax on liquor sales, tax on contracts, and tax on export duties)	X				
Payroll tax			X		
Fees for instructional activities					
Tuition fees					
Degree/nondegree programs		X	X		
On-campus/distance education programs		X	X		
Advance payments		X			
Chargeback	X				
Other fees (registration, labs, and remote labs)		X			
Affiliation fees (colleges)			X		
Productive activities					
Sale of services					
Consulting	X		X		X
Research	X		X	X	X
Laboratory tests	X		X		
Patent royalties, share of spin-off profits, and monetized patent royalties deal			X	X	
Operation of service enterprises (television, hotel, retirement homes, malls, parking, driving school, Internet provider, and gym)			X		
Financial products (endowment funds and shares)			X		
Production of goods (agricultural and industrial)		X	X	X	
Themed merchandises and services (smart card)	X	X	X	X	X
Rental of facilities (land, classrooms, dormitories, laboratories, ballrooms, drive-through, concert halls, mortuary space, and movie shooting)			X	X	
Sale of assets (land, residential housing, and art treasures)					

Category of income	Source of income				
	Government	Students and families	Industry and services	Alumni/philanthropists	International cooperation
Fund raising					
Direct donations					
Monetary grants (immediate and deferred)			X	X	X
Equipment			X	X	
Land and buildings	X			X	
Scholarships and student loans	X		X	X	X
Endowed chairs, libraries, and mascot			X	X	
Challenging/matching grants		X	X	X	
Religious donations (Zakat)		X		X	
Indirect donations (credit card, percentage of gas sales, percentage of stock exchange trade, and lectures by alumni)			X		
Tied donations (access to patents and share of spin-off profits)			X		
Concessions, franchising, licensing, sponsorships, and partnerships (products sold on campus, names, concerts, museum showings, and athletic events)			X		
Lotteries and auctions (scholarships)		X	X		
Loans					
Regular bank loans	X		X		X
Bond issues (regular and social impact)		X	X	X	

Source: Compiled by Jamil Salmi.