



**STRENGTHENING EDUCATION AND
LEARNING SYSTEMS TO DELIVER
A 4IR-READY WORKFORCE**



The African Center for Economic Transformation (ACET) is a pan-African economic policy institute supporting Africa's long-term growth through transformation. We produce research, offer policy advice, and convene key stakeholders so that African countries are better positioned for smart, inclusive, and sustainable development. Based in Accra, Ghana, we have worked in nearly two dozen African countries since our founding in 2008.

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ACRONYMS

4IR	Fourth Industrial Revolution
BECE	Basic Education Certificate Examination
COTVET	Council for Technical and Vocational Education and Training
DBE	Diploma in Basic Education
ECOWAS	Economic Community of West African States
ESMTDP	Education Sector Medium-Term Development Plan
ESP	Education Strategic Plan
FCUBE	Free Compulsory Universal Basic Education
GER	Gross Enrollment Rate
GES	Ghana Education Service
ILO	International Labor Organization
JHS	Junior High School
MELR	Ministry of Employment and Labor Relations
MOE	Ministry of Education
NDPC	National Development Planning Commission
NEET	Not in Education, Employment, or Training
NER	Net Enrollment Rate
PTPDM	Pre-Tertiary Teacher Professional Development and Management
SHS	Senior High School
SHTS	Senior High Technical School
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering, and Mathematics
TVET	Technical and Vocational Education and Training
YEA	Youth Employment Agency
YES	Youth Employment and Skills
WASSCE	West African Senior Secondary Certificate Examination



Executive Summary

Ghana has been classified as a lower middle-income country since 2010, with the GDP growth rate varying from 14 percent in 2011 to 2.2 percent in 2015 and 6.5 percent in 2019. The population continues to grow at a rapid rate and is projected to reach 37.9 million by 2025 from 27 million in 2014. However, this has not been accompanied with rapid job creation, particularly for the youth, with the youth unemployment rate standing at 16.9 percent in 2015. Out of the 200,000 entering the labor force annually, only 20,000 secure jobs in the formal sector making it imperative for more young people to have the skills and knowledge to create their own innovative and productive jobs.

Ghana's education system and policies need to be strengthened to ensure that skills relevant to the Fourth Industrial Revolution (4IR) are taught, especially at the secondary level. These essential skills include foundational literacy and numeracy; digital skills; entrepreneurship; science, technology, engineering, and mathematics (STEM); and soft skills such as communication and leadership that will enable young people to engage in and create innovative jobs. Research has shown that secondary education should provide young people with work-readiness skills, allowing them to transition smoothly to the labor market. Among demand-side stakeholders surveyed in this study, 61.5 percent indicated that the minimum qualification level they take is secondary while 30.8 percent said primary and 7.7 percent said tertiary. This finding supports the proposition that secondary education should provide young people with relevant skills to be productive in the labor market. However, findings from this study also show that recruits often lack the basic skills required by employers.

While progress has been made regarding access to education, many children remain out of school. The 1996 Free Compulsory Universal Basic Education (FCUBE) policy stipulates that basic education – comprising kindergarten, primary, and junior high school (JHS) – must be freely accessible and inclusive. In 2017, the free senior high school (SHS) policy was launched to expand access by removing cost barriers mainly through the absorption of school fees. However, existing physical infrastructure has been unable to absorb the increase in enrollment resulting in the implementation of a double-track system for oversubscribed schools. Unfortunately, increased access to secondary education has not been accompanied by an improvement in quality.

This study finds that for the education system in Ghana to achieve its goals, it has to prioritize quality education for teachers themselves and systematic support for their professional growth. Although teacher training policy stresses that curricula shall be competency based, the reality is that current curriculum and assessment methods for teacher training are highly exam focused, with little room for the development of good teaching skills. The curriculum is congested and does not focus on key skills such as problem-solving, critical thinking, collaboration, communication, and digital literacy and is disconnected from the curricula taught in schools. Another finding is that female role models can help to increase female uptake of STEM and technical and vocational education and training (TVET), and that having more trained female teachers has a positive effect on enrollment and learning outcomes.

As the nature of work changes, demand-side actors (employers) are well placed to advise and contribute to curriculum development design and review, and also to provide career guidance to students. There has been little investment in career guidance across the secondary education system in Ghana. This is partly due to low industry involvement and a lack of a framework for structured career guidance within schools. From our research, 63 percent of SHS teachers and administrators believe that career guidance is not embedded within JHS and SHS systems. Having structured career guidance can encourage young women and girls to follow career paths usually considered more suited to men.

Poor physical infrastructure is widespread, with many schools unable to admit the disabled as a result. Likewise, digital infrastructure is also limited—only 50 percent of regular secondary schools and 25 percent of technical schools have access to the internet. This limits the ability of teachers and students to rapidly access relevant information, contributing to poor learning outcomes. The difficulties of gaining skills relevant to the evolving labor market lead many young people to enter training programs to improve their skillset. Results from the survey show that 53.2 percent of university graduates are attending or plan to attend an institution to upgrade their knowledge and skills.

The informal sector in Ghana employs around 90 percent of the total workforce, a majority of them being women. The informal sector is characterized by lack of access to credit, high financial risk, income insecurity and unsafe working conditions.



Part 1. Study overview

1.1. Background to the study

This study is part of a six-country project on Youth Employment and Skills (YES) and the changing nature of work. The project examines education and training systems and their ability to adjust to meet evolving labor demand in light of rapidly evolving digital technologies and the Fourth Industrial Revolution (4IR). The six countries are Côte d'Ivoire, Ethiopia, Ghana, Niger, Rwanda, and Uganda.

The project evaluates the policies, regulations and institutional arrangements aimed at boosting educational outcomes and employment opportunities, especially job creation using innovative education and training initiatives.

One-fifth of the global population under the age of 25 now resides in sub-Saharan Africa (SSA), the world's youngest region, which is growing at a rapid rate. The region's working-age population is expected to reach 600 million in 2030, with a youth share of 37 percent —bigger than that of China. In Ghana specifically, the population was projected to hit 31 million by 2020. Between 2000 and 2010, the average annual population growth rate was 2.5 percent (GSS et al, 2015; GSS, 2014).

1.2. Objectives of the study

The overarching objective of the study is to examine the YES challenges and opportunities in Ghana. The study reviews the structure and composition (demographic, education, and skills) of the workforce as well as the policies, regulations, and institutional arrangements aimed at implementing innovative education and training initiatives and boosting employment opportunities for youth. It discusses digital technologies, job creation, and the skills needed for 4IR. The study focuses on four main questions:

1. How is labor demand in industry¹ changing in the face of digital technologies?
2. What is the current level of mismatch between labor supply and the demand for skills, and what are the implications for employment?
3. How are education and training systems responding to the changing nature of work in Ghana?
4. What role is industry playing to ensure that education and training systems are producing the right workforce?

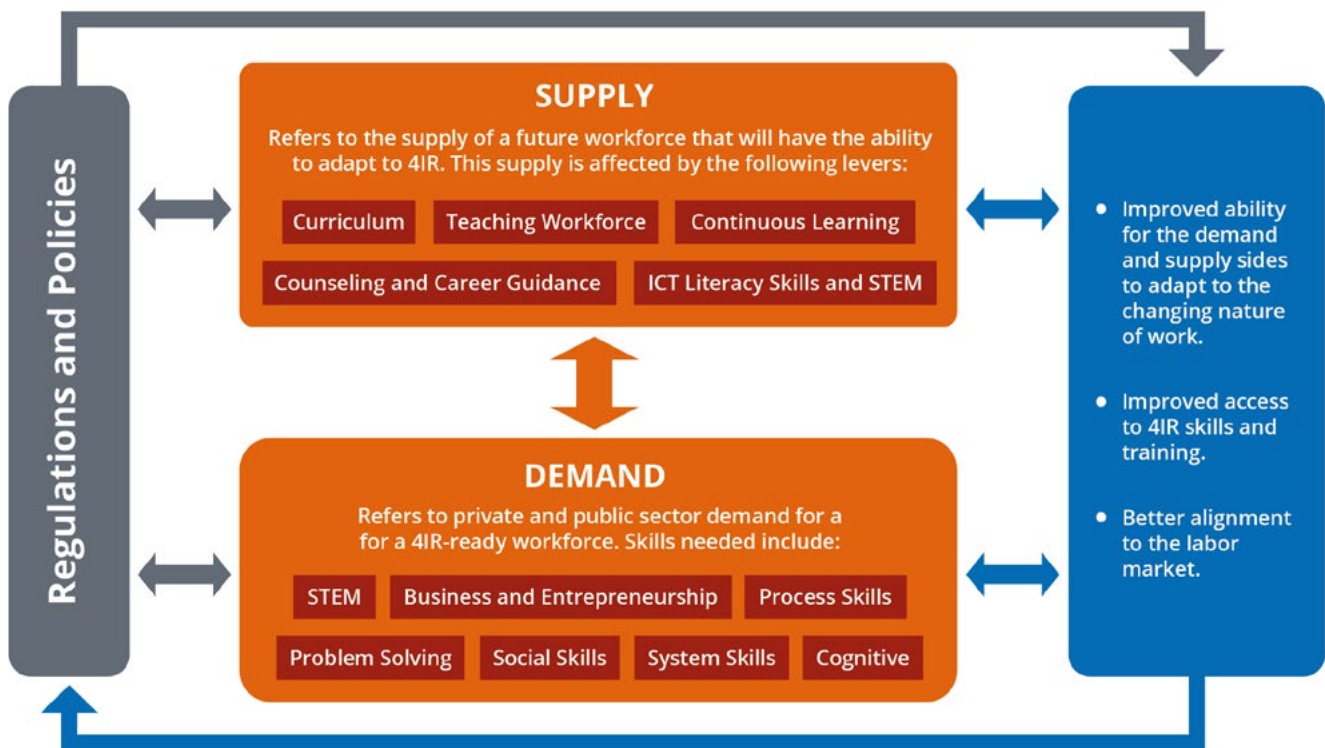
The answers to these questions are critical for informed decision-making on how to restructure education and training systems to meet the key challenges of rapid youth population growth, skills mismatch, and the changing nature of work.

¹ In this study, the term "industry" refers to agriculture, manufacturing, and services.

1.3. Analytical framework

Figure 1 provides the analytical framework for the study. Policies and regulations are fundamental drivers for alignment of the education and skills development systems with the changing world of work. They influence the supply, quality, and relevance of the workforce in terms of hard skills as well as crucial soft skills such as critical thinking, analysis, problem solving and communication.

Figure 1. Analytical framework



The study examines how the following five education-related levers drive supply and demand factors:

- Ensuring the alignment of curricula with the changing needs of the labor market.
- Investment in developing and maintaining a professional teaching workforce ready for 4IR-relevant pedagogical approaches, skills, and subjects.
- Early exposure to the workplace through internships and apprenticeships, with early access to career guidance counselors and career fairs.
- Physical and digital infrastructure development for safe buildings, high access to computers and the internet, and frequent classes to develop ICT skills.
- Creating a culture of lifelong learning, with both demand and supply sides ready to continuously adapt to changing skills demands.

Supply refers to the present and near-term supply of labor and covers youth—i.e., students; fresh graduates; employed; and those not in education, employment, or training (NEET)—while demand refers to employers who use these human resources for production.

The top and bottom arrows in Figure 1 represent the use of regulations to drive reform in a continuous process aimed at reducing the time and strengthening the capacity for the market to adapt to new technology. Access to education is defined as physical (distance, facilities, human resource) but the costs (tuition uniforms, transportation, feeding) and the socio-cultural norms that govern access are also considered. From a financial aspect, school attendance is sometimes discouraged due to the fact a young person attending secondary school can be seen as a source of income loss from labor activities, particularly in rural areas.

This study also explores the key drivers and challenges to education access and examines the quality and relevance to the workforce of each of these education levers, with inputs and recommendations from the demand and supply side.

1.4. Methodology

Desk review

The sources of information for this study include secondary data from literature on labor and education, as well as the informal sector from an educational and labor market perspective. The main government documents included the Demographic and Health Surveys, Education Sector Analysis, Education Sector Performance Report, National Employment Policy and Labor Force Surveys.

Primary data collection

Qualitative and quantitative primary data were collected in the Northern, Ashanti, Western and Greater Accra regions through focus group discussions and key informant interviews with students, graduates, formal and informal sector workers, teachers and administrators, policymakers, employers, and development partners. This study was conducted between October 2019 and May 2020.

On the supply side, key informant interviews were conducted with representatives from government agencies and departments that focus on education and labor such as the Ministry of Education (MOE); Council for Technical and Vocational Education and Training (COTVET); National Council for Curriculum and Assessment (NaCCA); Ghana Education Service (GES); and the National Development Planning Commission (NDPC). On the labor side, representatives from the Ministry of Labor and Employment Relations and the Youth Employment Agency (YEA) were interviewed. Secondary school teachers and administrators, university graduates, associations, and development partners were also interviewed. Focus group discussions were held in the four regions with junior high school (JHS) and senior high school (SHS) students. Each discussion had 10 participants. In each region, three schools were surveyed – one JHS, one SHS, and one senior high technical school (SHTS). Development partners were interviewed, including, GIZ and the British Council. There were 325 respondents.

Part 2. Country overview

This section outlines the demographic and labor force composition of the Ghanaian population, with some emphasis on the youth. The information is disaggregated by sex and age.

2.1. The political and socio-economic environment

Ghana has been independent since March 6, 1957 and operates a multi-party democracy led by an executive president and a parliament elected every four years. The country is divided into 16 administrative regions, and subdivided into 170 districts. Accra is the capital and the Greater Accra region comprises more than 4 million people. Ghana's population includes several ethnic groups. The major ones are Akan (48 percent), Mole-Dagbani (17 percent), Ewe (14 percent), Ga-Dangme (7 percent), and others (14 percent) (GSS et al, 2015). In 1969, the National Population Policy of Ghana was implemented in response to high population growth and fertility rates. This policy was amended in 1994 and included targets such as reducing the total fertility rate from 5.5 in 1993 to 3.0 by 2020 and reducing the population growth rate to 1.5 percent per annum by 2020 (GSS et al., 2015).

Table 1. Population dynamics

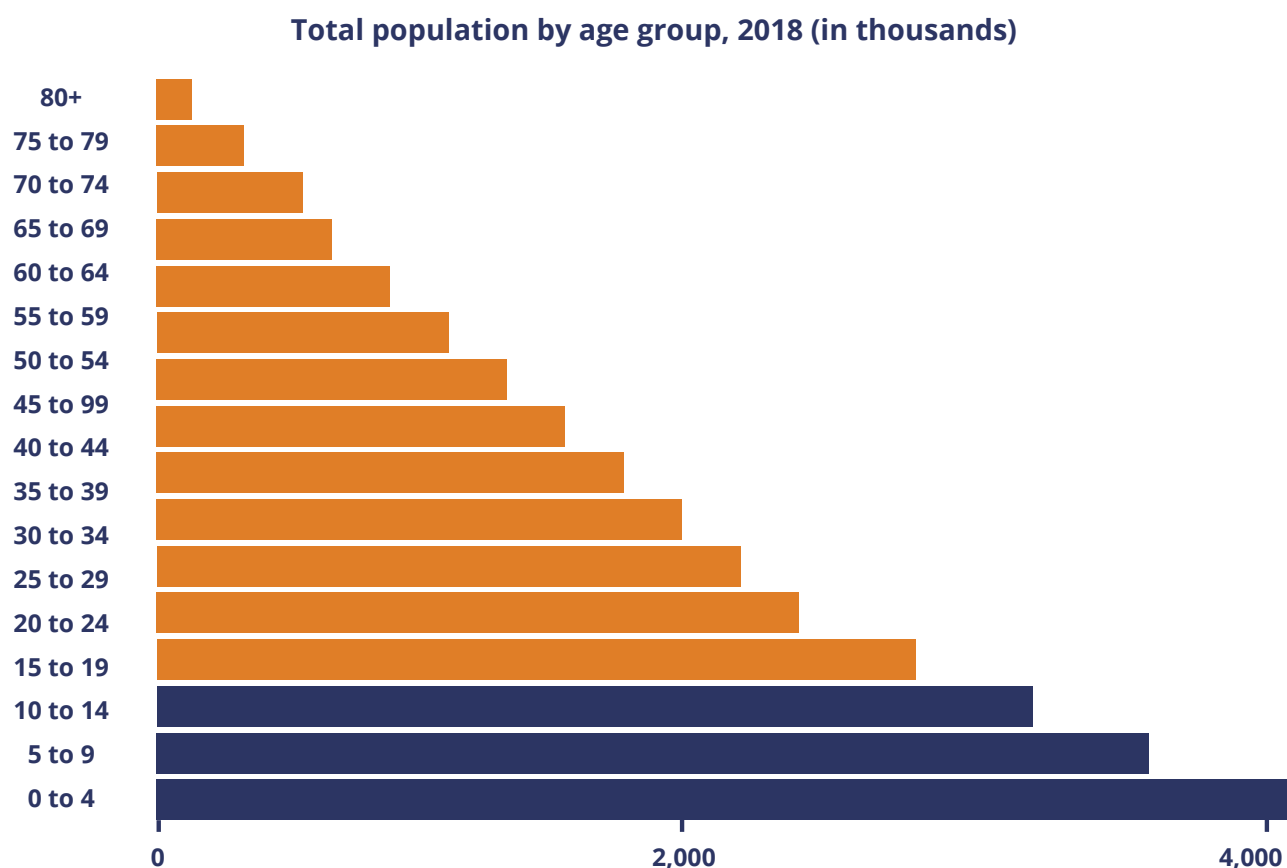
	Working age (percent of total population)	Youth (15-35 years) (percent of total population)	Total population (millions)
2000*	53.4	18	18.9
2015	55.1	31.6	27.7
2025 (projection)	56.7		37.9

Note: Ghana defines the youth age group as 15-35 years. Working-age population is 15-64 years.

* In the 2000 Ghana Population and Housing Census, the youth population was measured as 15-24 years.

Source: GSS, 2015; GSS, 2012

Figure 2. Population structure



Source: UNESCO

In 2010, Ghana was classified as a lower middle-income country. Since then, the GDP growth rate has varied from 14 percent in 2011 to 2.2 percent in 2015 and 6.5 percent in 2019.

2.2. Overview of education and skills development

Through the Education Strategic Plan (ESP) 2018-2030 and the Education Sector Medium-Term Development Plan (ESMTDP) 2018-2021, the government aims to transform teaching and learning. While Ghana has made clear progress in improving access to education, severe difficulties persist for thousands of children despite continuing implementation of the Free Compulsory Universal Basic Education (FCUBE) policy launched in 1996. The school environment is often not conducive due to overcrowded classrooms, poor sanitation, and inadequate infrastructure. Young people with disabilities and girls are often faced with the most obstacles to completing secondary education.

Ghana's FCUBE policy stipulates that primary school and junior high school, which last six years and three years respectively, must be freely accessible to all school-age children. Compulsory basic education is up to the age of 15, while senior high school lasts another three years.

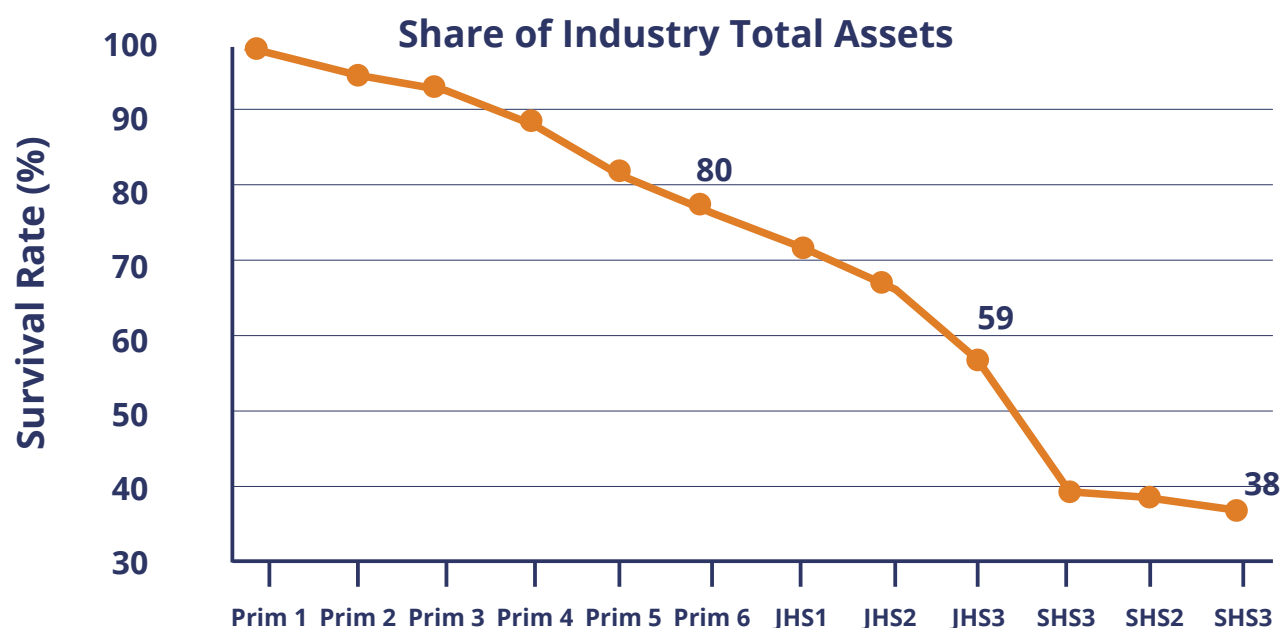
There are clear variations between the educational attainment of boys/men and girls/women. The literacy rate for men is significantly higher than that of women. Differences also persist between urban and rural locations (GSS et al, 2015). The overall literacy rate in Ghana is 76.6 percent (MOE, 2018a).

Table 2. Educational attainment, 2014 (%)

	Men (15-49)	Women (15-49)	Urban (men and women)	Rural (men and women)
Literacy rate	82	67	84.8	63
Those with no education	9.4	19.1	7.55	21.9
Completed secondary education or higher	11.8	6.3	12.8	4.35

Source: GSS et al., 2015

Progression within the education system is a concern. Poor transition rates from JHS to SHS reduce total enrollment numbers. For every 100 children who enter Primary 1, only 38 complete SHS 3. A major contributing factor to these poor transition rates is the high number of students repeating school years and dropping out, particularly between JHS 3 and SHS 1. However, it is important to note that these figures reflect the situation before the introduction of the free SHS policy (MOE, 2018a).

Figure 3. Progression rates from Primary 1 to SHS 3

Source: MOE, 2018a

The management of education in Ghana is fragmented across the 20 agencies that fall under the Ministry of Education, contributing to a lack of coordination particularly when it comes to the provision of technical and vocational education and training and non-formal education. The education system in Ghana consists of both public and private schools. At the basic level, over 20 percent of enrollment is in private schools. However, at the SHS level, enrollment levels within private schools decrease to 6 percent of total enrollment (MOE, 2018a).

Table 3. Gross Enrollment Rates (GER) and Net Enrollment Rates (NER) for SHS and JHS, 2010-11 to 2017-18* (%)

Year	JHS GER	JHS NER	SHS GER	SHS NER
2010-11	80	46	36.5	24.5
2011-12	81	46	37.1	23.6
2012-13	82	48	36.8	23.6
2013-14	82	49	43.9	21.8
2014-15	85	49	45.6	22.5
2015-16	88	50	49.6	25.2
2016-17	86	50	50.1	26.5
2017-18	86.1	48	55.9	29.2

* GER is the total number of children, regardless of age, at a given level of schooling as a proportion of all children at the official age for that level. This can exceed 100 percent due to early or late entry or grade repetition. NER is the total number of children of appropriate age for a given level of schooling as a proportion of all children at the official age for that level. It cannot exceed 100 percent.

Source: MOE, 2018b

At the JHS level, there has been some improvement in GERs and NERs between 2010 and 2017, but there are still many out-of-school children, particularly in the northern regions. The reasons include inadequate school infrastructure, distance to school, and high costs (MOE, 2018a). The Complementary Basic Education program aims to fast-track literacy, numeracy, and life skills for out-of-school children using context-specific approaches. It then places such children in formal schools. Between 2012 and 2017, the program placed 248,556 young people. During the 2016-17 academic year, the program placed another 114,153 pupils into the formal system. It has consistently met and exceeded its enrollment target but in 2012-16, the target of 50 percent female enrollment fell short (MOE, 2018b).

Faced with the likely impact of 4IR on the evolving labor market, the ESP provides for important reforms to make ICT access widespread across the education system, equipping children and young people with ICT skills and embedding ICT in education management through technology-based training (MOE, 2015). Although the use of ICT is on the rise in Ghana, inequalities persist. Only 15 percent of households own a computer while 22.4 percent have access at home to the internet. Gender differences exist, with only 17.7 percent of women aged 15-49 having ever used the internet as compared with 41.1 percent of men. Internet use is also more frequent in urban than in rural areas. The more education that men and women receive, the greater the incidence of them owning and using a computer, mobile phone, and the internet. Youth between the ages of 15 and 35 have much better computer functionality than those above the age of 36 (GSS, 2018).

Secondary education

Secondary education consists of JHS and SHS. There are no entrance exams to JHS for all students who complete primary education. In the third year of JHS, students sit the Basic Education Certificate Examination (BECE) to qualify for SHS. In 2017, 468,060 students sat the BECE, up from 391,032 in 2013. Besides transitioning from JHS to SHS, students can opt for technical and vocational education and training schools or institutes which offer a wide variety of courses that last two or three years.

Regarding equity in access, the gender parity index has been on the rise, reaching 0.96 in 2016-17 at the SHS level. JHS to SHS transition rates have been higher for females than males, 69 percent and 65 percent respectively, in 2015-16. In 2017, President Nana Addo Dankwa Akufo-Addo declared that SHS would be a part of the FCUBE program and launched the free SHS policy, which has four pillars:

1. Removal of cost barriers through the absorption of fees approved by the Ghana Education Service (GES) council
2. Expansion of school infrastructure and facilities to accommodate increased enrollment
3. Improvement in quality and equity through provision of core textbooks and supplementary readers, teacher rationalization and deployment, etc.
4. Development of employable skills to improve the competitiveness of Ghanaian students

The free element of the policy refers to free tuition, admission, library fees, facilities fees such as ICT, examination fees, boarding, and meals. In 2015-16, SHS enrollment almost doubled from 393,995 in 2007-08 to 787,861. Between 2013 and 2016, 100,000 students each year on average were placed but were unable to enroll due to financial constraints. In 2017-18, this number fell to around 62,000 (MOE, 2018b). Every student that sits the BECE and is allocated a place in SHS is eligible for free SHS.

As a result of the introduction of free SHS, the number of students who took the BECE and qualified for SHS drastically increased, while school infrastructure remained limited. As a result, since the 2018-19 academic year, the government introduced the double-track system to alleviate crowding in oversubscribed schools. For example, students in the “green track” attend school for a semester while “gold track” students are on vacation, and vice versa. This plan was introduced as a short-term measure to ensure schools can take in more students, reduce class sizes, increase contact hours with teachers, and increase the number of holidays. At the end of SHS 3, students sit the West African Senior Secondary Certificate Examination (WASSCE).

The Secondary Education Improvement Project (SEIP) is in place to support the implementation of the ESP. The main objective is to increase access to secondary education in underserved districts and improve quality in low-performing schools. The program has initially targeted 125 SHS and has awarded over 10,000 scholarships (for three years) to needy students, particularly girls.

TVET for an improved workforce

The government is pushing for increased uptake of technical and vocational education and training (TVET) to improve the quality of the workforce. TVET institutions in the public sector involve 19 ministries, with the Council for TVET (COTVET) coordinating and overseeing these institutions. To better align and standardize the TVET sector, the government has placed all technical and vocational institutions under the MOE to reduce occurrences of duplication. The government's strategic priorities for TVET include providing the youth with skills needed in industry and making the Ghanaian workforce globally competitive and attractive.

Across Ghana, there are formal TVET programs at the secondary and pre-tertiary level supervised by the GES, as well as private vocational schools and centers run by the National Vocational Training Institute. Students complete courses that combine classroom and practical training leading to formal qualifications such as a foundation certificate after two years, the Technician Certificate I after three years and the Technician Certificate II after four years. Those who obtain technician status can enroll in tertiary courses at polytechnics. At the tertiary level, there are 10 technical universities or polytechnics across Ghana, specializing in a wide range of occupations (MOE, 2018b).

TVET has suffered from a poor public image as a place for academically weak people. The sector is also plagued by outdated equipment and curriculum as well as a lack of standardization, poor investment, and fragmentation. In 2014, only 3.7 percent of BECE candidates chose to attend TVET institutions.

Overall, the pre-tertiary TVET sector in Ghana is often viewed as ineffective due to the poor quality of facilities—less than 3 percent of education funding is allocated to TVET (MOE, 2018a). Enrollment across the TVET sector increased from 41,065 in 2013-14 to over 63,000 in 2017-18. During the same period, enrollment in SHTS programs increased from 24,396 to over 49,000.

Table 4. Numbers and enrollment in SHTS

Indicators	2013-14	2014-15	2015-16	2016-17	2017-18
Public Schools	149	154	155	164	115
Private Schools	39	38	29	32	62
Total Schools	188	192	184	196	177
Boys Technical Enrollment	22,756	22,982	24,464	26,092	40,362
Girls Technical Enrollment	1,640	1,925	1,360	3,185	9,056
Total Enrollment	24,396	24,907	25,824	29,277	49,418
Percent Technical Enrollment	13.6	13.3	13.6	13.6	13.6

Source: MOE, 2018b

The participation of women and people with disabilities in the TVET sector is particularly low. This negative situation is worst in traditionally male-dominated areas such as engineering and construction. In 2015-16, female enrollment in TVET was 26 percent, down from 31 percent in 2012-13. In SHTS, girls accounted for only 11 percent of total enrollment in 2016-2017. Conversely, enrollment in polytechnics increased for young women between 2010-11 and 2013-14 from 30 percent to 35 percent. However, the gains were mainly in arts and business programs rather than in science, technology, engineering, and mathematics (STEM). Trades such as catering, hospitality, fashion, and cosmetology are female dominated while males dominate the electrical, engineering and construction trades. This report's research found several respondents claiming that many women feel STEM and TVET subjects are too difficult and more suitable for men. As a result, even those who do take these programs often feel intimidated and are reluctant to participate although often, they perform exceptionally well.

Undoubtedly, those in the informal and non-formal TVET sectors gain relevant skills but they often do not hold recognized qualifications. Given the nature of 4IR, combining these relevant skills with ICT skills is necessary. Programs such as the Ghana TVET Voucher Project, implemented by COTVET, provides competency-based training to master craft persons, workers, and apprentices in the informal sector. It also teaches technological and digital skills. Increased support should be provided to upgrade informal apprenticeships to better align the skills being learned with the changing nature of work.

Education financing

The vast majority of education sector funding—87 percent in 2012 and 78 percent in 2015—comes from the government budget. Only 3 percent of public funding for education is allocated to TVET and less than 3 percent is allocated to special education and non-formal education (MOE, 2018b). According to the World Bank, Ghana in 2018 spent 3.9 percent of GDP on education, slightly lower than the SSA average of 4.3 percent. However, for the preceding 10 years, Ghana exceeded average SSA spending on education, recording 5.5 percent in 2007 and 4 percent in 2017, a notable downtrend. To achieve Sustainable Development Goal 4, the Education 2030 Framework for Action stresses that governments should allocate 4-6 percent of GDP to education.

2.3. Labor market trends

Of Ghana's working-age population, 67.6 percent are employed, 9.1 percent are unemployed, and 23.3 percent are not currently active. For both men and women, employment status varies by geographic location—70.4 percent of the rural population is employed compared with 65.1 percent of the urban population. The proportion of employed men (71.4 percent) is higher than that of women (64.7 percent). The youth unemployment rate of 16.9 percent in 2015 was higher than the 11.9 percent unemployment rate for all ages (GSS, 2015). Underemployment is 9 percent, the working poor is 10 percent, and vulnerable employment is high at 66 percent (GSS, 2015; ILOSTAT, 2017).

Table 5. Labor market indicators and trends (%)

	2000			2015		
	Male	Female	Total	Male	Female	Total
Labor force participation (youth)	75.1	69.2	71.7	75.1	69.2	71.7
Labor force participation (total)	76.7	72.7	74.7	79	72.4	75.2
Unemployment rate (youth)	11.1	12.5	11.9	16.4	17.4	16.9
Unemployment rate (total)	10.1	10.7	10.4	11.5	12.5	11.9
Employment to population ratio	62.8	57.2	59.6	71.4	64.7	67.6

Ghana uses the youth age group of 15-35 years.

Source: GSS, 2005; 2015

Although its share of GDP has declined, agriculture remains the largest employer sector—52 percent of total employment in 2012-13 and 28.4 percent in 2019 (MELR, 2014; ILO, 2019). Agriculture provides 71.1 percent of jobs, though in urban areas the dominant employer is wholesale/retail trade at 30.9 percent (GSS, 2015).

The informal sector employs around 90 percent of the total workforce, with self-employed petty traders forming the majority. The sector is characterized by lack of access to credit, high financial risk, income insecurity, high incidence of child labour and unsafe working conditions. Although on the rise in recent years, women's participation in the formal sector is low.

Table 6: Sectoral composition of employment, 2019 (%)

Economic Activity	Total Employment
Agriculture, forestry, and fishing	29.3
Mining and quarrying	0.9
Manufacturing	16.9
Utilities	0.4
Construction	3.6
Wholesale and retail trade, repair of motor vehicles and motorcycles	19.2
Transport, storage, and communication	3.3
Accommodation and food service activities	4.8
Financial and insurance activities	0.8
Real estate – business and administrative activities	2.5
Public administration and defense, compulsory social security	2.5
Education	7
Human health and social work activities	3.3
Other services	5.6

The informal sector employs around 90 percent of the total workforce, with self-employed petty traders forming the majority. The sector is characterized by lack of access to credit, high financial risk, income insecurity, high incidence of child labour and unsafe working conditions. Although on the rise in recent years, women's participation in the formal sector is low.

Source: ILOSTAT

Table 7. Informal employment (non-agricultural activities), by sex (%)

Year	Male	Female	Total
2006	79.0	93.6	87.1
2013	78.7	91.9	85.9
2015	75.9	88.3	83.1

Source: World Bank, World Development Indicators

Table 8. Youth not in education, employment, or training

Year	Male	Female	Total
2005-09	461,000	645,000	1,106,000
2010-14	494,000	780,000	1,274,000
2015-19	739,000	919,000	1,658,000

Source: ILO

Regarding technology, fewer than 1,000 graduates each year have high-level ICT skills (ACET, 2018). In recent years, mobile technologies and services have generated more than 1.7 million informal and formal jobs in SSA (Ndung'u and Signe, 2020). However, only 6.7 percent of formal sector jobs in are in occupations with high ICT intensity. According to World Economic Forum analysis, Ghana captures 64 percent of its human capital and has a high capacity to adapt to the needs of future jobs but low exposure to the future of work (Samans and Zahidi, 2017). However, there is low exposure to technologically driven occupations and Ghana must close the gap between the skills supply and demand.



Part 3. Supply-side perspectives

This section covers two aspects of supply-side perspectives. The first covers access to secondary and TVET education. The second covers both quality and relevance.

3.1. Access to secondary education and skills training

National data show that around 25 percent of students given a place in SHS do not enroll mainly due to financial difficulties. The free SHS policy aims to alleviate issues of access, particularly where cost has been a barrier to attendance. TVET focuses mainly on the traditional full-time TVET system and does not take into account learning that has taken place outside this system. Thus, those who have acquired skills informally are not able to get their skills accredited (MOE, 2018a).

Curriculum

Stakeholders involved in curriculum design and implementation include the Ministry of Education, Ghana Education Service, National Council for Curriculum and Assessment, National Board for Professional and Technician Examinations, and COTVET.

The SHS curriculum is generally updated every five years, broadly based on government reforms. The government last undertook reforms in ICT, STEM, and TVET subjects in 2012-13 when the SHS duration was changed from four years to three years. Survey respondents indicated that contact hours for skills acquisition in STEM and non-STEM per week are 5-8 hours for STEM and 19 hours for non-STEM. Evidently, the dominance of non-STEM subjects is not in line with the government's vision. Gender equality, particularly in TVET, remains difficult. Respondents claim that parents and society believe TVET is not for girls and some do not take these subjects in fear that they will not gain employment.

Ghana's labor market is dominated by informal activities, and the majority of those workers acquire their skills informally. COTVET is implementing projects across the country to improve the skills of informal sector workers. A respondent from the Fashion Designers' Association indicated that COTVET provides training opportunities for trainee master craftspersons that are free and cuts across all trades. Such interventions are positive as they provide opportunities to those outside the formal system.

Teacher training

Between 2011-12 and 2016-17, the proportion of trained teachers increased from 87 to 90 percent. In the past, it was possible to teach at a basic level after completing a three-year Diploma in Basic Education (DBE). To improve the quality of teaching, current reforms stipulate completion by all teachers of a four-year bachelor's degree. In 2018, President Akufo-Addo announced that colleges of education providing DBE programs would be upgraded to university colleges. After completion of this four-year degree, teachers must obtain a formal teaching license from the Ministry of Education and complete one year of assessed in-service training before being granted a teaching permit (Kamran et al., 2019).

Four TVET teacher training programs lead to recognized qualifications that can be gained only at public universities. In 2011-12, these institutions had an enrollment of over 7,000 but no information is currently available on their completion rates (MOE, 2018a).

According to government policy, there are avenues for teachers to upskill after qualifying. Teachers under the GES can get study leave with pay. There is also in-service training, which is supposed to be carried out every term and serves as a 'refresher' course. However, teachers and trainers face inconsistencies in accessing training opportunities that typically come after the introduction of a new curriculum. Most teacher respondents indicated that they often have to seek these training opportunities themselves as the institutions they are a part of rarely offer training.

In any country that aspires to increase female uptake of STEM and TVET, having female role models can help, and recruiting trained female teachers has positive effects on enrollment and learning outcomes. Respondents said there is generally a good mix of male and female teachers at the lower secondary level. However, when looking specifically at STEM subjects, female teachers tend to teach the sciences while male teachers are concentrated in mathematics. At the upper secondary level, 95 percent of the teachers surveyed were male, and one of the schools visited in northern Ghana reported no female teachers.

Career guidance

From this report's research, 63 percent of secondary school teachers and administrators believe that career guidance is not embedded at JHS and SHS levels. Some 60 percent felt career guidance is more prevalent at the JHS level. About 72 percent of respondents suggested that industry representatives should take up invitations to school career fairs (usually once a year), indicating that this lack of contact is strongly felt at the SHS level where there is also a shortage of career counselors.

Respondents from TVET institutions felt that career guidance is embedded within the learning system and is often delivered as part of subjects such as entrepreneurship. Occasionally, students, graduates and alumni from universities and other tertiary institutions attend SHTS and mentor students on educational and career progression. One respondent said, "University students and graduates serve as real-life role models to high school students, guiding them to acquire university education." However, this support is not systematic and depends on each school's strategies and priorities. Some schools engage with foundations and associations that provide support and career guidance to students. In the absence of formal structures for career guidance, some teachers and national service personnel take it upon themselves to advise students, but this is very unstructured.

Physical and digital infrastructure

Physical infrastructure in terms of adequate space, as well as the quality of such spaces (e.g., classrooms and other buildings) in secondary schools across Ghana, is often inadequate. The total number of JHS has increased from 12,436 in 2012-13 to 16,850 in 2017-18. However, in 2017/18, there were only 916 SHS, which clearly explains the overcrowding. Students, teachers and administrators stressed that generally, buildings are weak and the provision of tables and chairs woefully inadequate. Those institutions with better facilities received support from the Ghana Education Trust Fund (GETFund). Under the SEIP, 23 new SHS are due to be operational from the 2020-21 academic year (MOE, 2018b).

Table 9. Number of senior high schools in Ghana

SHS	2013-14	2014-15	2015-16	2016-17	2017-18
Public	556	562	578	620	630
Private	284	301	294	307	286
Total	840	863	872	927	916

Source: MOE, 2018b

Similarly, due to inadequate infrastructure, only a small percentage of JHS graduates are admitted into public and private TVET schools. Children with disabilities are disproportionately affected by inadequate infrastructure in basic and secondary schools. Most schools do not have handrails and only 8 percent of basic schools have ramps. Special schools are better equipped but even then, only 32 percent have ramps and 23 percent have handrails (MOE, 2018a). This lack of infrastructure has negative implications for learning outcomes.

Table 10. Quality indicators at SHS, 2013-2018

Quality Indicators	2013-14	2014-15	2015-16	2016-17	2017-18
Student-to-Teacher Ratio	19:1	20:1	21:1	20.8:1	22:1
Textbooks per Student (English)	0.59	0.56	0.50	0.51	0.72
Textbooks per Student (Science)	0.55	0.50	0.44	0.44	0.72
Textbooks per Student (Maths)	0.59	0.56	0.50	0.50	0.78
Student-to-Classroom Ratio	43	43	46	47.8	48.8
Student-to-Seating Ratio	1.2:1	1:1	1:1	1:1	1.01:1
Student-to-Desk Ratio	1.2:1	1.4:1	1:1	0.86:1	1:1

Source: MOE, 2018b

In the 4IR era, good digital infrastructure is just as important as physical infrastructure. About 75 percent of the JHS and SHS surveyed have working computers but not enough for the teacher and student population. Some schools without computers (all of them SHS institutions) previously had some that developed faults that were never repaired. The SHS institutions on the other hand all stated that they have access to working computers. Regarding stable electricity, only one school reported not having access while 50 percent of the schools did not have access to the internet. TVET institutions performed worse with only 25 percent having access to the internet.

Life-long learning

National qualifications frameworks in Ghana often focus on enhancing formal learning outcomes and tend to neglect non-formal and informal learning, particularly regarding recognition, validation, and accreditation. Effectively integrating all forms of learning in the education system will help to promote life-long learning by allowing individuals to progress from informal and non-formal to formal education.

3.2. Quality and relevance of supply-side levers

Access, quality, and relevance in education are linked and have an impact on each other. Young males and females need easier access to well-developed curricula and well-equipped institutions, particularly for STEM subjects. For example, improving physical and digital infrastructure is a priority for enabling young people to reach their full potential, but having computers in schools with no internet or even electricity is of little use. In addition, training opportunities are needed for the great majority of the workforce, which is concentrated in the informal economy; the COTVET Voucher Project is one such positive example. The same training applies to teachers, as well. To provide young people with robust skills relevant to 4IR, teachers must be well equipped with current knowledge and technical skills.

Curriculum

Ghana's secondary education curricula must respond to the changing needs of the labor market by enabling young people to learn varied and relevant skillsets. Young people need good foundational skills to develop more advanced skills at the SHS level. They should have basic STEM knowledge and be competent in the use of ICT to increase their productivity in the labor market (ACET, 2018).

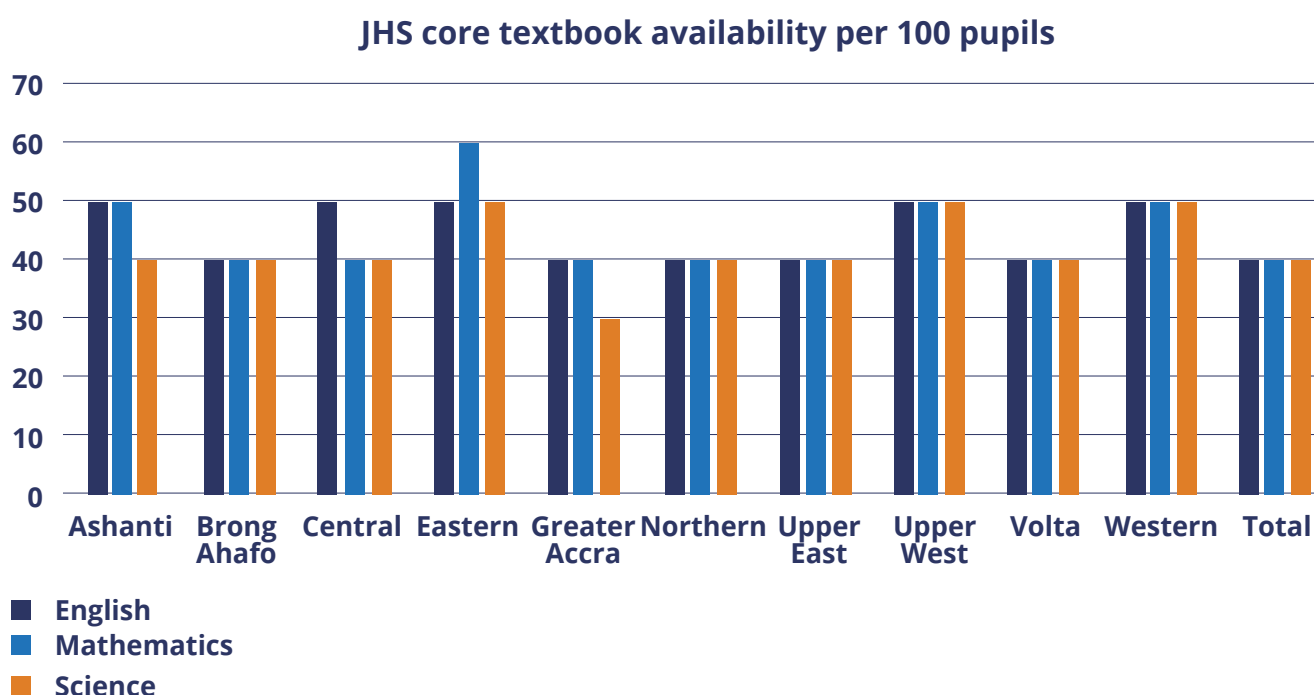
However, SHS trends between 2011 and 2015 have consistently failed to meet the policy target of 60 percent enrollment in science and 40 percent enrollment in arts and humanities. Such low enrollment levels in STEM subjects at SHS make it difficult to see an increase in STEM uptake at the tertiary level (MOE, 2018a).

Table 11. Enrollment in SHS programs, by subject (%)

Program	2011-12	2012-13	2013-14	2014-15
Agriculture	6.8	6.1	5.6	5.3
Business	22.0	20.7	17.7	15.5
Science	11.6	11.7	11.6	11.9
Arts	39.1	40.5	43.0	44.1
Technical	3.3	3.3	3.3	3.1
Vocational – Home Economics	11.1	11.1	12.8	13.8
Visual Arts	6.0	6.0	6.0	6.4

Source: ESA 2018

Since 2013-14, the textbook-pupil ratios have fallen short of the GES target of three textbooks per child at the JHS level. In 2017-18, the education ministry found that at the JHS level, there were 40-50 textbooks per 100 pupils in English, mathematics, and science (MOE, 2018a; MOE, 2018b). Teachers surveyed at SHS and SHTS institutions highlighted the lack of textbooks as a major issue.

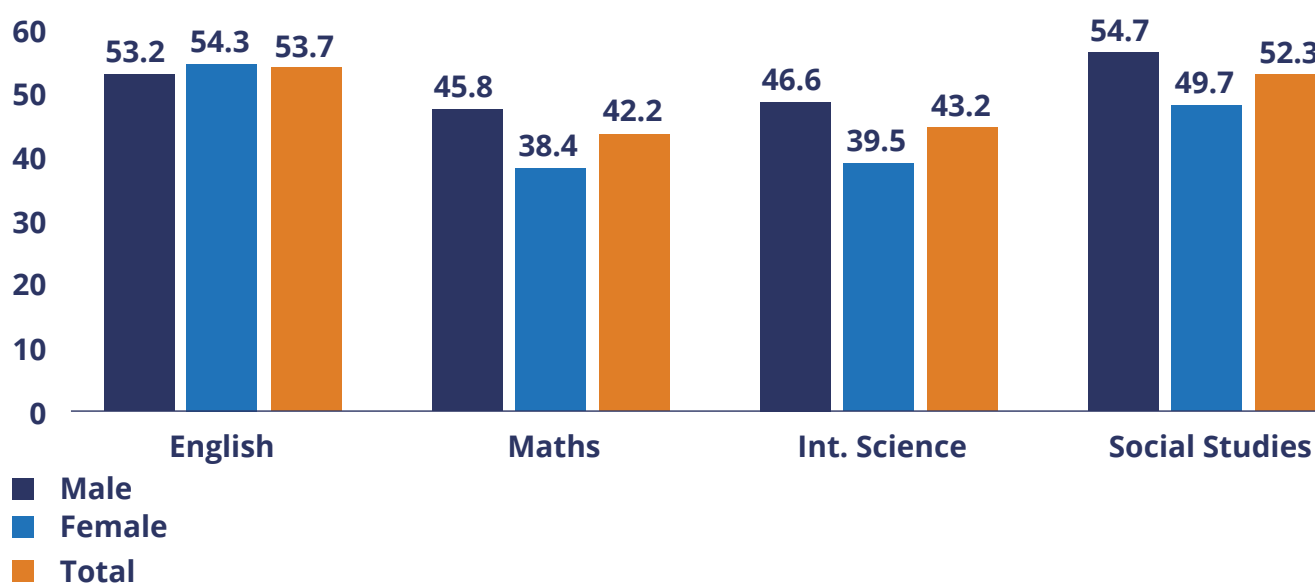
Figure 4. JHS core textbook-to-pupil ratio, by region, 2017-18

Source: MOE, 2018b

Textbook-student ratios continue to decline at the SHS level and are lower for science than English and mathematics. In 2011-12, textbook-student ratios were 0.74 for English, 0.75 for mathematics, and 0.68 for science. By 2015-16, these figures had dropped to 0.50, 0.50, and 0.44 respectively. One reason for this is the delay in the production and distribution of textbooks, particularly when a new curriculum has been developed. In addition to the delay, there are reports of errors in textbooks. The low availability of good quality textbooks reflects the poor planning and lack of management capacity.

WASSCE results in Ghana have varied across subjects. The best results have been in social studies and English and the worst in integrated science and mathematics. Boys tend to perform better in STEM subjects and science while girls perform better in English (MOE, 2018b). TVET examination pass rates have been consistently low in recent years, a concerning trend as qualified and technical professionals are needed to enhance productivity and promote economic growth in Ghana.

Figure 5. WASSCE pass rates in core subjects by gender, 2017 (%)



Source: MOE, 2018b

From the university graduates surveyed, 85.1 percent believe that their secondary education prepared them for university. Those who disagreed cited the lack of practical training and the overemphasis on theory. About 57.4 percent of graduates said secondary education prepared them for workplace skills and knowledge, while only 8.9 percent said it prepared them for critical thinking. Based on this analysis, secondary education is more relevant to further education than to the labor market.

Among teachers and administrators surveyed, 60.9 percent said there is little to no connection between the curriculum and the work environment. Many are of the view that the main problem is that SHS does not provide enough practical training. For TVET on the other hand, 86.4 percent of respondents believe there is a clear connection between curriculum and the work environment. From informal sector respondents, 70 percent indicated that learning institutions should focus on practical training and TVET courses.

Data collected as part of this study show that on average, at the JHS level, students have 1-2 hours a week dedicated to ICT while in SHS, they have 4-6 hours a week with more hours spent on elective ICT than core ICT. Some students said there is a shortage of teachers taking ICT classes. It has been argued that ICT and other key skills relevant to 4IR must be given priority in curriculum development to enable increased productivity and economic transformation in Ghana.

Teacher training

For any education system to achieve its goals, teachers must themselves receive quality education and systematic support for professional growth. Ghana's 2012 Pre-Tertiary Teacher Professional Development and Management (PTPDM) policy framework aims to provide clear standards for the teaching profession. This includes policies on expectations for institutions that train teachers and those providing continuous professional development programs (MOE and GSS, 2012).

The PTPDM framework stresses competency-based training in place of the obsolete and highly exam-focused curriculum and assessment methods currently used, which give little room for developing good teaching skills. Although some skills are thoroughly learned on the job, these skills should be prioritized during teacher training. These skills include classroom management and inclusiveness to prepare them to teach children from a range of backgrounds, regardless of gender, ability, and ethnicity (MOE, 2018a). The curriculum itself does not focus on key skills such as problem-solving, critical thinking, communication, and digital literacy. Additionally, training is disconnected from actual school curricula, leaving new teachers ill-equipped to teach the given curriculum once they are deployed (MOE, 2018a).

The SEIP aims to provide extra training to mathematics and science teachers in project schools to enhance learning outcomes for their students. Since the program began in 2014, about 2,620 science and mathematics teachers have received extra training. However, the teachers interviewed generally stated that they lack support for continuous professional development.

Technical and teaching qualifications along with industry experience are all important for TVET instructors. In 2016-17, however, while 71 percent of teachers in public TVET institutions had teaching qualifications, only 52 percent had technical qualifications. These figures are higher for TVET institutions under the GES. Private TVET institutions have much lower figures: 40 percent holding teaching qualifications and only 25 percent with technical qualifications. The optimum student-teacher ratio is 15:1 but in 2016-17, the actual ratios were 19:1 in GES TVET, 9:1 in other public TVET institutions, and 7:7 in private institutions (MOE, 2018a).

Regarding ICT, at the SHS level, teachers and administrators suggested that they were not required to be competent in the use of basic digital programs and tools as compared with respondents at the JHS level. On the use of basic programs such as MS Word and PowerPoint, 86 percent of JHS teachers and administrators believe that they need to be competent, particularly those in Greater Accra. At the SHS level, 62 percent of respondents feel they do not need to be competent in the use of such programs. Some teachers feel that ICT training is provided to ICT teachers only. Those who seek to strengthen their skills do so independently and often without any assistance from the institution they are affiliated to.

This study found that the difficulties secondary school teachers face include inadequate textbooks and other teaching and learning materials, low morale, restricted career progression and limited in-service training along with poor working conditions, salary arrears and few incentives. TVET trainers/teachers face similar issues of inadequate facilities and equipment, aggravated by the practical nature of TVET.

One general issue is the high rate of teacher absenteeism and attrition. In 2014-15, overall teacher absenteeism was 14 percent. Attrition rates increased to 4 percent in 2016 from 2 percent in 2009 (MOE, 2018a). High levels of teacher absenteeism significantly hamper learning outcomes of young people, demoralize school organizational culture, and constitute a waste of financial resources (ADEA).

Career guidance

There has been low industry involvement and investment in TVET in Ghana. Industry stakeholders often cite the lack of manufacturing companies as a major obstacle in establishing partnerships between TVET institutions and industry. However many firms and organizations are reluctant to provide internships and formal apprenticeships mainly because of a lack of incentives. Nevertheless, career guidance appears to be stronger in TVET than in regular high schools. Many young people's career ideas are influenced by parents, siblings, and other people who may have their own biased views.

In general, formal career guidance needs to be strengthened across the educational system. The presence of a counselor or structured career guidance helps overcome stereotypes that hamper women and girls from entering male-dominated occupations. These negative perceptions about young women and girls taking on STEM and TVET cuts across society, from the attitudes of parents to the students themselves.

Physical and digital infrastructure

The government has made some progress in reducing the number of schools under trees and schools needing major repairs. Almost half of all respondents felt that most educational institutions are not disability friendly. Most schools interviewed said they admit disabled people, but the lack of suitable infrastructure tends to discourage them from attending. In terms of sanitation, only 44 percent of basic schools have functioning water facilities and only 54 percent of SHS have hand washing facilities (MOE, 2018a).

The biggest challenge in providing good quality TVET is posed by poor training facilities. Some well-equipped institutions have usually received substantial donor support, which is often not distributed equitably. This leads to a few TVET institutions with modern and sophisticated equipment and increasingly basic and obsolete equipment down the line to informal training. (MOE, 2018a).

Poor infrastructure also affects digital infrastructure. Most respondents (74.4 percent) suggested that JHS and SHS teachers use digital tools in their lessons compared with only 45 percent of TVET teachers. Ghana's ICT infrastructure, including access to and quality of internet, is severely inadequate, hampering up-to-date teaching and learning. Where secondary schools have STEM laboratories, they often lack the technology to equip students with modern digital skills. Teachers often gather information using the internet on their mobile phones. Some survey respondents said budgets were the biggest constraint—funds allocated to infrastructure are often diverted to other needs.

Life-long learning

Survey results show that 53.2 percent of university graduates attend or plan to attend an institution to upgrade their knowledge and skills due to the changing nature of work. Other respondents stated that they are not interested in or do not have the time to further their skills because they are already in work. Those in the informal sector, such as apprentices, see greater value in upskilling—70.5 percent of respondents said they are willing to upgrade their skills or that of their employees to match their needs.



Part 4. Demand-side opportunities and constraints

The supply side cannot reach its full potential without relevant input from the demand side.

4.1. Curriculum development and career guidance

As the nature of work changes, employers (the main demand-side actors) are well placed to advise on secondary and TVET curriculum design and review and also provide career guidance to students. Among employer respondents, 78 percent said such involvement would help make education more relevant to the rapidly evolving labor market by influencing the types of skills being taught. Respondents identified communication skills as the skill that most new employees lack. Strong links between schools and employers are needed to introduce young people to the world of work. However, only 26.9 percent of companies and entrepreneurs surveyed said they have been invited to or take part in career fairs. Those who have been involved in career fairs had either been contacted by the school or through organizers of such fairs and received no formal assistance from government actors.

Most employers (61.5 percent) said their minimum qualification level is secondary while 30.8 percent said primary and 7.7 percent said tertiary. This reinforces the notion that secondary education should provide young people with relevant skills to be productive in the labor market. Organizations, if given the opportunity, can help young people strengthen their practical skills through internships, apprenticeships and mentorship.

4.2. Labor market/work environment

Most employer respondents (69.6 percent) indicated that there are equal opportunities for young men and women to thrive in the work environment. However, the informal sector is dominated by women but the most lucrative trades are male dominated. Those trained informally should be able to gain certification to enable them to enter highly competitive industries.

Building partnerships with organizations such as the National Association of Beauticians and Hairdressers or the Ghana Cooperative Fashion Designers Association, which trains young people in the informal sector, could be one successful approach for public-private collaboration on building skills. Associations like these have strong links with industry and help provide career guidance through internships and apprenticeships.

Although 93.2 percent of respondents from the informal and formal sectors use technology for their business, formal sector employers said that they have to train new recruits in the use of digital tools.

Corruption is a cross-cutting problem: employed and unemployed graduates and other individuals in the formal and informal sector said that often, employees are not recruited on merit and only secure jobs through someone they know on the inside.



Part 5. Conclusions and policy recommendations

In terms of curriculum content, TVET is better aligned to the changing nature of work than the core JHS and SHS subjects, which lack a significant practical proponent, leaving students with technical knowledge they cannot implement. This is often a result of poor infrastructure and access to key learning tools such as functioning computers, stable electricity, and well-equipped STEM laboratories. The introduction of free SHS in 2017 has increased SHS enrollment dramatically—but without significant improvements in the quality and relevance of education, which includes learning materials and modern, innovative tools. Females experience different challenges compared to their male counterparts, from the education system to the labor market. More needs to be done to ensure that young women are able to reach their full potential through STEM and TVET courses. Other policy recommendations follow.

- **Improve digital infrastructure.** Given the nature of 4IR, the government should prioritize digital skills for both students and teachers. ICT literacy should be among the qualifications for teachers, along with mandatory ICT training every 2-3 years. This means teachers and students must have access to working computers, projectors, internet, and TVET tools.
- **Ensure teachers are equipped with 4IR relevant skills to be able to impart these skills to young people.** The teacher training curriculum should be reformed to ensure teachers have the competencies and pedagogical know-how for improving learning outcomes for young people.
- **Increase the supply and quality of learning materials.** The government should take stock at all levels of secondary education of textbooks and practical equipment for STEM and TVET and update them.
- **Foster greater cooperation between secondary schools and the private sector.** To better match the curriculum with the market, the industry must be engaged to advise on curriculum design and review.
- **Make structured career guidance a core part of the curriculum.** Ghana needs a comprehensive career guidance profession with counselors whose in-depth knowledge of a wide range of careers and sectors enables them to advise young people. This profession should have a good mix of men and women who encourage young men and women to take up careers that break the stereotypes.
- **Uplift the TVET sector.** Embark on a multimedia public information program to boost the image of the TVET sector so that it is not seen as a route for academically poor individuals. Financial incentives and scholarships can be provided to young people who follow the TVET path.

- **Develop clear pathways and linkages between informal and formal education.** Greater attention and support should be given to non-formal and informal training providers to ensure they are not left behind as the nature of work changes. Increased access to programs similar to the Ghana TVET Voucher Project should be a priority to allow informal workers the opportunity to gain 4IR relevant skills.
- **Harmonize the organizations that provide education.** Ghana's education system is fragmented, with numerous ministries and agencies involved. Their work and priorities should be consolidated for better coordination and implementation to improve learning outcomes at all levels.

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