

DIGITAL INCLUSION

Digital opportunities: INNOVATIVE ICT SOLUTIONS FOR YOUTH EMPLOYMENT

Report



Telecommunication Development Sector



Digital opportunities: Innovative ICT solutions for youth employment

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This report was developed and published by the International Telecommunication Union (ITU), and grew out of the youth employment and entrepreneurship initiative between ITU and Telecentre.org Foundation. The partnership seeks to advance youth employability, entrepreneurship, and social inclusion by addressing challenges surrounding integrating young people into the employment market, highlighting innovative approaches and uses of ICTs, and providing pathways to boost self-development, knowledge, and skills.



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Foreword

Today's youth face enormous challenges finding a job and earning a decent income. Around the world, youth are far more likely than adults to find themselves unemployed or in low paying, informal sector jobs. When youth struggle at the beginning of their careers the repercussions can last a lifetime. That's why it's imperative that we take concrete steps to ensure youth have meaningful work opportunities and can lead productive and fulfilling lives.

This report aims to cast a spotlight on an area that offers promising solutions-digital jobs and entrepreneurship opportunities. The ongoing information technology revolution is transforming established sectors from agriculture to health and creating new ones from microwork to apps development. This requires people with the skills to both use and develop the computer, mobile phone and internet applications that are powering these changes. The needs span a wide range of skills, from the most basic to very advanced, offering opportunities for people of varying abilities.

The information technology revolution is also fuelling new business creation. Tech-savvy individuals are applying their creative energies and becoming entrepreneurs in record numbers. Recognizing that entrepreneurship can be a viable career option, many governments are enacting policies aimed at encouraging more graduates to become job creators, not job seekers.

ITU has a long history in helping young people to become entrepreneurs and launch ICT careers. That's why I am proud to be the Patron of the [Young Innovators Programme](#) at ITU TELECOM World events, and I am delighted that this report was developed in response to the Youth Employment and Entrepreneurship initiative between ITU and Telecentre.org Foundation. As Director of the ITU Telecommunication Development Bureau (BDT), I am fully engaged in empowering youth through initiatives such as my flagship [m-Powering Development](#) initiative, which seeks to harness the power of mobile phones to promote education, commerce, health, sport and more. International Girls in ICT Day, celebrated on the fourth Thursday of every April, is likewise designed to ensure that young women join the swelling ranks of ICT careers.

Youth have advantages in this new environment which provides access to a myriad of learning systems, job matching services, entrepreneurship courses, contests, and even start-up funding. The private sector is behind many of these resources, with government and non-profit organizations playing important roles as well. It is a vibrant area with new resources being made available every month, most of which are free or very low cost. I am pleased that BDT has made these resources available to youth worldwide in our new Youth Employment and Entrepreneurship Resources Database at www.itu.int/ITU-D/youth.

What will be required to connect more youth to this new world of opportunities? Part of the answer lies in building awareness and an appreciation of the forces and innovations that are constantly shaping and reshaping pathways for employment and entrepreneurship. It is a dynamic environment where governments and other stakeholders need to be more adept at developing and launching initiatives in real time. This is a challenging task, yet it is something that can, and must, be done. Successes can be found in every corner of the world, making it imperative that we act quickly to improve the workforce prospects of the next generation. It is my hope that this report inspires action.



Brahima Sanou
Director
Telecommunication Development Bureau

Table of contents

	<i>Page</i>
1 Introduction	1
1.1 Organization of report	2
1.2 Notes and limitations.....	2
2 Youth and unemployment.....	3
2.1 A global crisis	3
2.2 The skills mismatch.....	5
2.3 Regional trends: Developed countries.....	6
2.4 Regional trends: Developing countries.....	7
2.4.1 Latin America and the Caribbean	8
2.4.2 Arab States.....	8
2.4.3 Central and South East Europe and CIS	9
2.4.4 Asia	10
2.4.5 Sub-Saharan Africa.....	10
3 New employment opportunities – Macro sectors	11
3.1 Agriculture	12
3.2 Health	13
3.3 Offshore services	15
4 New employment and entrepreneurship opportunities – Emerging sectors	17
4.1 Online job services and job matching.....	18
4.2 Microwork and crowdsourcing.....	18
4.3 Apps development.....	21
4.3.1 App demand in developing countries.....	22
4.3.2 Tech hubs for app development.....	23
4.4 Accessibility.....	24
4.5 Gaming.....	25
4.6 Mobile phone repair and computer assembly	26
4.7 Green jobs.....	26
4.7.1 Green jobs and ICTs	27
4.7.2 Green jobs for youth.....	28
5 ICT employability skills	28
5.1 Computer literacy	29
5.2 Digital literacy	30
5.3 Web literacy.....	32
5.4 Complementary skills.....	34

	<i>Page</i>
6 Entrepreneurship skills and support	35
6.1 Entrepreneurship skills	36
6.2 Mentoring and networking.....	38
6.3 Crowdfunding, contests, and other sources of capital	39
6.4 Toolkits and training programmes.....	41
6.5 Mobile resources	41
6.6 Comprehensive programmes	42
7 Getting there – becoming ICT-savvy.....	42
7.1 New learning models	44
7.1.1 Blended learning.....	44
7.1.2 Self-directed learning.....	46
7.1.3 Collaborative learning.....	48
7.2 Partnerships for learning and jobs.....	49
7.3 Learning and innovation places	50
7.3.1 Co-working spaces and technology hubs.....	51
7.3.2 Hacker/maker spaces.....	51
7.4 Repositories, games and mobile resources	52
7.4.1 Online repositories	52
7.4.2 Games	52
7.4.3 Social media.....	53
7.4.4 Mobile phones – learning on the go.....	53
7.5 Certification	54
7.5.1 Badges.....	55
8 The role of government	56
8.1 ICTs in education.....	57
8.2 ICT skill development in non-formal educational settings	59
8.3 Alternative accreditation and certification methods	59
8.4 Public-private partnerships.....	60
8.5 Policies to support youth entrepreneurship.....	61
9 Conclusion	62
References	64
Glossary	69

1 Introduction

Youth make up 17 per cent of the world's population and 40 per cent of the world's unemployed, according to the International Labour Organization. It is a crisis with many dimensions. High youth unemployment not only hampers economic growth, for youth it can be a debilitating experience that affects their desire and ability to lead productive and rewarding lives. With the youth bulge swelling the ranks of working age populations worldwide, urgent attention is needed to address the plight of youth and provide them with better opportunities for employment.

Against this backdrop, ongoing advances in information and communication technologies (ICTs) are transforming old sectors and creating new ones. No sector has been untouched, from farming to manufacturing to service industries. This transformation is effectively making digital literacy a prerequisite for both wage employment and creating one's own business. ICT literacy not only qualifies people for jobs in conventional job sectors, but also opens doors to participate in rapidly growing markets such as business process outsourcing and microwork. People with more advanced ICT skills can take advantage of an even wider range of opportunities brought about by the growth of the "app economy," mobile phones, social media, and the game industry.

For today's youth this signals an opportunity, if the right steps are taken. Youth with access to technology are coming of age as digital natives, the early adopters of ICTs and better positioned than their parents to harness the power of ICTs in new and imaginative ways. The premise of this report is that much more needs to be done to realize these opportunities. Youth in developing countries lag their developed world counterparts in experience with ICTs.¹ Moreover, even those with access are not being equipped with the ICT skills they need to succeed. There is an overall mismatch between what the market is demanding and what institutions of learning—formal and non-formal—are providing. Schools and other centres of learning are challenged to keep pace with rapid technological changes and many are stuck in old methods of instruction that are ill suited to ways in which ICT skills can be acquired. The knowledge and skills for creating a business are even more lacking in instructional programmes.

Against this gloomy picture there is an explosion of new learning opportunities that employ novel (and often free or inexpensive) ways for people to gain the right skills. The same forces that have unleashed a myriad of new career options are generating new forms of learning. Open courseware, flipped classrooms, mobile learning, and other innovations are redefining the realm of the possible, propelling a learning revolution that has the potential to reach a far greater proportion of the world's youth.

What is needed for youth to acquire ICT and entrepreneurship skills and seize new ICT-enabled career prospects? Is there need for action when the market is creating new opportunities for people with ICT skills, and people can go online and learn these skills? Unquestionably yes. Many opportunities are still largely untapped, and policies and programmes are not aligned to take advantage of the possibilities. The nonstop proliferation of new applications and services makes concerted efforts to prepare youth with the appropriate skills all the more challenging. Accordingly, the primary aim of this report is to spotlight emerging trends, focusing on new work opportunities, new skills, and new ways of acquiring these skills. The hope is that readers will gain a better understanding of a range of new and innovative ways that youth can realize better futures.

In the course of the research for this report, the authors encountered a huge volume of job matching services, employability programs, contests and other programs for entrepreneurs, online learning platforms, and other useful resources. It quickly became apparent that it would be nearly impossible to

¹ See chapter 4, "Measuring the world's digital natives" in ITU, *Measuring the Information Society 2013* (Geneva: ITU, 2013), www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2013.aspx.

adequately represent all of these in a report of reasonable length. Accordingly, the project has developed a database that includes the resources and can be continuously updated as new ones become available. It is hoped that this database will provide youth with a valuable asset in their efforts to secure meaningful employment and entrepreneurship opportunities. The database is available at: www.itu.int/ITU-D/youth.

A focus on emerging trends is an inherently risky proposition. Some of the nascent markets and learning programmes will become huge forces that reshape entire industries; others may never gain widespread traction and fizzle. That said, ongoing ICT-driven change is a certainty, and not pursuing new strategies is a far riskier proposition. Fortunately, many of the ideas contained in this report can be pursued with far less expense compared to earlier times. The technology and education sectors (both private and non-profit) are driving many of the changes, generating new opportunities, services, and products. It is possible to pilot a new curriculum, for instance, without having to create one. Doing this requires public-private partnerships, imagination, and an openness to taking risks. It is also essential that new initiatives have a system for tracking progress, making mid-course corrections, abandoning strategies that are not working, and identifying and incorporating emerging opportunities. Institutional nimbleness is a key attribute of successful initiatives, and this will become increasingly important in the years ahead.

1.1 Organization of report

This report begins with background information. Chapter 2 presents data on the state of youth unemployment and underemployment, illustrating the scale of the challenge and some of the factors that have contributed to the current state of affairs. Chapter 3 examines three sectors – agriculture, health, and offshore services – to demonstrate how ICTs have transformed and created new job opportunities in both traditional and new industries.

The primary focus of the report follows, covering new employment sectors, new skills, and new ways of learning. Chapter 4 identifies and discusses a range of emerging work opportunities, from microwork to app development, that are a direct result of advances in ICTs and global internet diffusion. Many of these areas are experiencing exponential growth. Chapters 5 and 6 discuss the skills needed to take advantage of the new opportunities, with Chapter 5 looking at employability skills and Chapter 6 focusing on entrepreneurship skills as well as programs that foster entrepreneurship. Chapter 7 examines the diverse ways in which youth can become equipped with ICT and entrepreneurial skills, again with a greater focus on new models of learning. Chapter 8 discusses the role of government in supporting youth employment and entrepreneurship. Chapter 9 offers some concluding thoughts.

1.2 Notes and limitations

Each one of these chapters could occupy many books, and indeed the literature is immense. It is beyond the scope of this report to provide in-depth discussions of the ways ICTs can be used in agriculture or the pedagogical strengths and weaknesses of different learning models. Rather, the report aims to provide a landscape view of the issues, focusing on high level summaries and discussion. This has necessitated a number of shortcuts to guide the writing of the report.

One of these is a working definition of employment and entrepreneurship. For purposes of this report a World Bank categorization is applied. It includes wage employment, self-employment, and farming. Under this categorization, entrepreneurship is a form and subset of self-employment. Self-employment, though, can be a double-edged sword. “Many businesses in developing countries are started not to exploit

business opportunities but because the owners cannot find satisfactory jobs.”² In fact, “most micro- and small enterprises in developing countries are just forms of survivorship, with limited chances to grow.”³ This definition is not intended to diminish the importance of self-employment. It is crucial for job creation.

Entrepreneurship, on the other hand, adopts Schumpeter’s idea of an entrepreneur as one who is dynamic and willing to take risks to exploit existing business opportunities and create new ones. The Global Entrepreneurship Monitor⁴—the largest ongoing global study of entrepreneurial dynamics in the world—measures the multiple phases of entrepreneurship. The phases start out with potential entrepreneurs—those that see opportunities in their area and believe they have the capabilities to start businesses—and moves through nascent and new entrepreneurs. Other definitions include the extent to which individuals would not be deterred by fear of failure in pursuing opportunities. In addition, the broader society can influence the spread of entrepreneurship through perceptions about this activity as a career choice, the status of entrepreneurs in society and positive representation of entrepreneurs in the media.⁵ This report focuses on the early stages of entrepreneurship.

2 Youth and unemployment

Around the world youth disproportionately suffer from the malaise of unemployment. The scale of the problem is immense, holding back economic growth while stifling the aspirations of people recently entering the workforce and at the beginnings of their careers. The causes of this situation are multifaceted, and manifest differently in each region. This chapter provides data and context about youth unemployment, and discusses the primary causes of this acute state of affairs.

2.1 A global crisis

Currently, 73 million young people are unemployed worldwide, with more and more youth finding longer lines for available jobs, according to the International Labour Organization (ILO).⁶ While the global youth unemployment rate had fallen to 11.6 per cent in 2007 from 13.1 per cent in 2002, it has reversed course and grew to 12.6 per cent in 2013.⁷ Moreover, even in countries where unemployment is low, youth unemployment is twice the national average or greater. Young people are three times more likely to be unemployed than their parents.⁸ However, official unemployment rates mask greater challenges, as the following two points illustrate.

² Mohammad Amin, “Necessity vs. Opportunity Entrepreneurs in the Informal Sector,” 2009, http://works.bepress.com/mohammad_amin/15.

³ World Bank, World Development Report 2013: Jobs (Washington, D.C.: World Bank, 2012), DOI: 10.1596/978-0-8213-9575-2.

⁴ Global Entrepreneurship Monitor, “GEM 2011 Global Report,” (Babson Park, Mass: Babson College, 2011), www.gemconsortium.org/docs/cat/1/global-reports. The GEM is the largest ongoing global study of entrepreneurial dynamics in the world, measures multiple phases on entrepreneurship, sponsored by Babson College (USA), Universidad del Desarrollo (Chile) and Universiti Tun Abdul Razak (Malaysia). Started in 1999, it aims to analyse the level of entrepreneurship occurring in a wide basket of countries. It measures entrepreneurship through both surveys and interviews to field experts, conducted by the teams of each country.

⁵ World Bank. World Development Report 2013: Jobs.

⁶ International Labour Organization, “Global Employment Trends for Youth 2013,” (Geneva: International Labour Office, 2013), 1.

⁷ International Labour Organization, “Global Employment Trends for Youth 2013,” 3.

⁸ Jenny Marlar, “Global Unemployment at 8% in 2011: Youth are three times more likely than older adults to be unemployed,” (*Gallup.com*, April 17, 2012), www.gallup.com/poll/153884/Global-Unemployment-2011.aspx.

Underemployed youth is triple the unemployment rate.⁹ These are predominantly youth who work in the informal sector, facing low wages, no benefits, and a higher probability to be laid off without any type of compensation. Many of these are subsistence jobs, which are common in Asia, sub-Saharan Africa, and Latin America. For example, sub-Saharan Africa has a youth unemployment rate close to 11 per cent, but three out of four workers are engaged in the informal sector. Although these jobs count as employment, they do little to contribute to an individual's well-being and a country's economic development.

In addition, 621 million youth are "idle"—known as NEET (not in education, employment, or training). Rates of idleness vary across countries and gender among 15 to 24 year-olds, ranging between 10 per cent (for men in Brazil, India, Pakistan, and Ukraine) and 50 per cent (for women in India, Pakistan, and Turkey).¹⁰ Protracted adverse labour market conditions have led youth to give up completely their job search or seek additional education.

Figure 1: Global youth unemployment and unemployment rate, 1991 – 2013



Source: International Labour Organization (ILO)¹¹

⁹ Mona Mourshed et al., *Education to Employment: Designing a System that Works*, (Washington, D.C.: McKinsey Center for Government, 2012), www.improvingthestudentexperience.com/library/general/EducationToEmployment.pdf

¹⁰ World Bank. *World Development Report 2013: Jobs*, (Washington, D.C.: World Bank, 2012), 6, DOI: 10.1596/978-0-8213-9575-2.

¹¹ International Labour Organization, "Global Employment Trends for Youth 2013," 8.

Figure 2: Unemployment rates by age range**Youth More likely to Be Unemployed and Underemployed
Among those in the Labour Force**

	% Unemployed	% Underemployed	%Employed full time for an employer
15- to 29-year-olds	15	26	43
30- to 49-year-olds	5	13	46
50- to 69-year-olds	5	13	36

Based on surveys in 148 countries and areas in 2011 - GALLUP

<http://www.gallup.com/poll/153884/Global-Unemployment-2011.aspx>

Source: Gallup

2.2 The skills mismatch

In addition to the protracted economic crisis from which many countries are still trying to recover, a troubling trend has emerged that experts call the skills mismatch. The skills mismatch is where “over-education and over-skilling coexist with under-education and under-skilling, and increasingly with skills obsolescence brought about by long-term unemployment.”¹² This situation has multiple implications for youth. It renders solutions to the employment crisis more difficult to find, and in the case of over-qualified youth society is “losing their valuable skills and forfeiting stronger productivity growth that would have been achieved had these young people been employed at their appropriate level of qualification.”¹³

According to a 2012 report by the McKinsey Centre for Government, across nine countries surveyed (Brazil, Germany, India, Mexico, Morocco, Turkey, Saudi Arabia, the United Kingdom, and the United States) only 43 per cent of employers said they could find employees with the right skills.¹⁴ This mismatch between what employers are looking for in new workers and the skills young people possess is particularly wide in theoretical and hands-on training, problem solving, and computer literacy.¹⁵

The unemployment situation varies significantly between developed and developing countries, and among and within regions. In general, in the developed world long-term unemployment among youth is becoming acute, resulting in high levels of dissatisfaction and a lack of trust in socio-economic and political systems. In the developing world, “as much as two-thirds of the young population is underutilized in some developing economies, meaning they are unemployed, in irregular employment – most likely in the informal sector, or neither in the labour force nor in education or training.”¹⁶

¹² Ibid., 1.

¹³ Ibid., 1.

¹⁴ Mourshed et al., *Education to Employment*, 10

¹⁵ Ibid., 36

¹⁶ International Labour Organization, “Global Employment Trends for Youth 2013,” 2.

Figure 3: Youth unemployment rates, by region

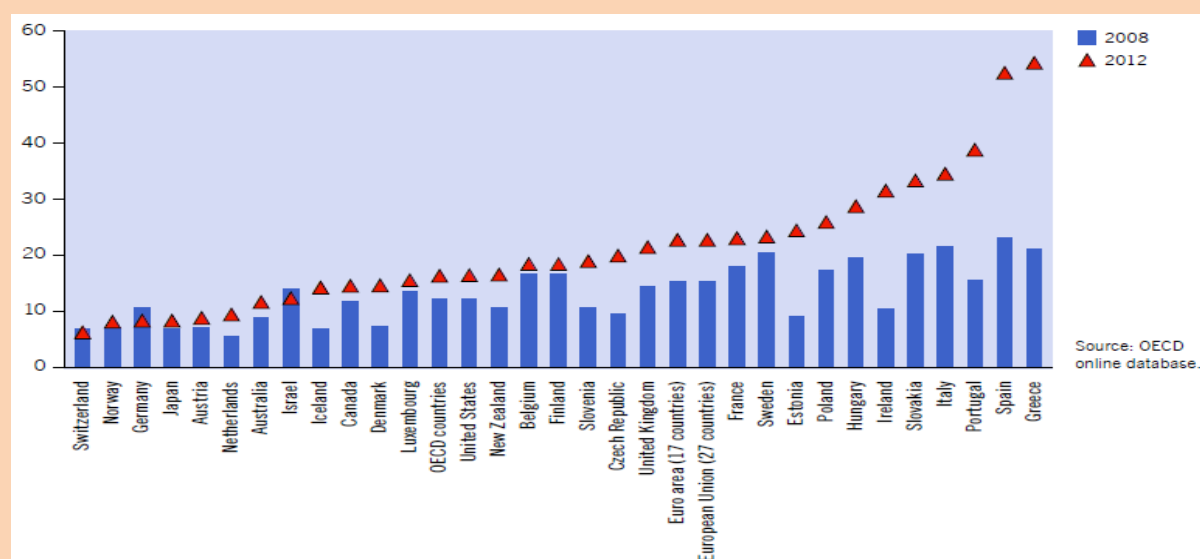
Youth unemployment rates 2000 and 2007–2016, by region (%)											
	2000	2007	2008	2009	2010	2011	2012p	2013p	2014p	2015p	2016p
WORLD	12.7	11.6	11.7	12.6	12.7	12.6	12.7	12.7	12.7	12.7	12.7
Developed Economies & EU	13.5	12.5	13.3	17.3	18.1	18.0	18.0	17.7	17.2	16.5	16.0
Central & South-Eastern Europe (non-EU) & CIS	20.0	17.5	17.0	20.5	19.4	17.6	17.5	17.6	17.5	17.5	17.5
East Asia	9.3	8.0	9.1	9.3	8.9	9.0	9.3	9.4	9.6	9.7	9.8
South-East Asia & the Pacific	13.2	14.9	14.2	13.9	13.6	13.5	13.7	14.0	14.2	14.2	14.3
South Asia	10.1	9.0	8.6	9.1	10.2	9.8	9.8	9.7	9.7	9.8	9.8
Latin America & the Caribbean	15.8	14.1	13.7	15.6	14.5	14.3	14.3	14.4	14.5	14.5	14.6
Middle East	24.0	24.8	25.7	25.2	25.4	26.5	26.9	27.5	28.0	28.6	29.0
North Africa	28.7	23.8	23.0	23.6	23.1	27.9	27.8	27.6	27.3	26.9	26.7
Sub-Saharan Africa	12.9	11.5	11.5	11.5	11.4	11.5	11.5	11.5	11.4	11.4	11.4

ILO, Trends Econometric Models, April 2012.

Source: International Labour Organization (ILO)

2.3 Regional trends: Developed countries

The youth unemployment rate in 2012 is estimated at 18.1 per cent.¹⁷ The situation has not improved in recent years with the number of unemployed youth increasing by more than 2 million from 2008 to 2012. By the second quarter of 2012, youth unemployment surpassed 15 per cent in two thirds of developed countries.¹⁸

Figure 4: Youth unemployment rates, 2008 and 2012 (second quarter, %)

Source: OECD online database.

Source: International Labour Organization (ILO)¹⁹

¹⁷ Ibid., 3.

¹⁸ Ibid., 4.

¹⁹ International Labour Organization, "Global Employment Trends for Youth 2013," 11

Youth not engaged in employment, education, or training (NEET) is one of the main challenges policymakers in developed economies face. In Japan and the United States, NEET rates were 9.7 and 15.6 per cent respectively in 2010, while the average for OECD countries was 12.8 per cent in that year.²⁰ Although NEET youth are highly diverse, they are more likely to live in a poor household, have low levels of education, be an immigrant or of ethnic minority status, or possess a disability.²¹ In addition, they are likely to lack the life skills required for formal employment as well as the social networks needed to obtain new opportunities. As a consequence, NEET youth are entering adulthood already in a marginalized position.

The present and future costs to society are large when young people stay disengaged from school and work. The costs of NEET youth alienation from the European labour market shows that absorbing just 20 per cent of this population into the labour market would save nations in the European Union more than EUR 21 billion a year collectively.²² In the United States, the estimated social cost for each disengaged youth amounted to USD 37 450 per individual per year.²³ These costs include lost earnings, public expenditures on health, crime, and victim costs, among others.²⁴

The quality of youth employment has declined. Youth increasingly find themselves in non-standard jobs, such as temporary employment and part-time work. Countries like Spain and Ireland have recorded increases in the youth part-time employment rate of 11.8 and 20.7 percentage points respectively between the second quarter of 2008 and 2011.²⁵ One out of three youth state that they opted for temporary work because they could not find a permanent job, a proportion that has been rising since the economic crisis started.²⁶

2.4 Regional trends: Developing countries

The labour market in the developing world is highly diverse and can range from the prevalence of self-employment and farming to the coexistence of traditional and modern modes of production.²⁷ Nearly half of the jobs in the developing world are in the informal sector. While a growing share of young people between ages 15 and 24 allocate most of their time to education and training, youth unemployment is still alarming in many countries, such as South Africa (above 40 per cent since early 2008).²⁸

²⁰ International Labour Organization, "Global Employment Trends for Youth 2012" (Geneva: International Labour Office, 2012), 31.

²¹ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, (Baltimore: International Youth Foundation, 2012), 8, www.microsoft.com/en-us/news/presskits/citizenship/docs/finalopp_for_action_paper.pdf.

²² European Foundation for the Improvement of Living and Working Conditions, *Young People and NEETs in Europe: First Findings*, (Eurofound, 2011), 5.

²³ Clive R. Belfield, Henry M. Levin, Rachel Rosen, "The Economic Value of Opportunity Youth," (Washington, D.C.: Corporation for National and Community Service and the White House Council for Community Solutions, 2012), 2.

²⁴ Ibid, 15.

²⁵ International Labour Organization, "Global Employment Trends for Youth 2012," 21.

²⁶ Ibid, 23.

²⁷ World Bank, *World Development Report 2013: Jobs*.

²⁸ Ibid.

2.4.1 Latin America and the Caribbean

In Latin America and the Caribbean, youth unemployment has declined recently but is expected to resume its upward trend.²⁹ Since 2003 the youth unemployment rate has followed a rollercoaster pattern, with the most recent two years from 2010 to 2012 marking a decrease from 15.4 to 12.9 per cent, according to the ILO. However, it is expected to increase again in the medium term. The youth unemployment rate varies among countries, but in all cases it surpasses that of adults. In fact, the ratio of youth to adult unemployment rates has steadily increased since 2000 from 2.5 to 2.8 in recent years. Values of above 3.0 are increasingly common, such as in Argentina and Brazil.³⁰

The youth unemployment rate is significantly higher among Latin American women. The percentage of unemployed young women (17 per cent) is 6 percentage points higher than that of young men (11 per cent) and the difference is largest in the Southern Cone countries.³¹ This difference reflects how many employers continue to offer certain jobs only to men, as they believe hiring women will entail labour costs due to maternity leave.

Low quality schooling and high dropout rates suppress youth employment. According to the Economic Commission for Latin America and the Caribbean, completing a high quality secondary education is an important threshold for increasing the odds of obtaining a quality job.³² While about 89 per cent of young people in the region begin secondary education, less than one-half complete it.³³ In addition, rates of educational achievement indicate that Latin American and Caribbean countries rank in the bottom third in all three subjects measured by the Programme for International Student Assessment (PISA), and 30 to 80 per cent of students performed at the lowest level in all subjects.³⁴

Employment opportunities do not necessarily increase with higher levels of education. In countries such as Argentina, Chile, and Peru there exists a higher concentration of unemployment among youth with secondary education than either primary or advanced education.³⁵ This situation reflects a skills mismatch wherein there is stronger demand for workers with a college education than those with secondary education.

2.4.2 Arab States

Youth unemployment rates in the Middle East continue to be the highest in the world. The 2012 youth unemployment rate was estimated at 28.3 per cent in the Middle East, and 23.7 per cent in North Africa.³⁶ Labour market conditions for young people remain dire, despite advances in educational attainment over the past two decades.³⁷ Gender disparities are also common in this region, with 42.6 per cent of young females unemployed, compared to 24.5 per cent among males.³⁸

²⁹ International Labour Organization, "Global Employment Trends for Youth 2013," 18.

³⁰ Ibid.

³¹ International Labour Organization, "Decent Work and Youth in Latin America," (Geneva: ILO, 2010), 18.

³² International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 6.

³³ UNESCO Santiago, *Education, Youth, and Development, UNESCO in Latin America and the Caribbean*, (Santiago: UNESCO, 2010), <http://unesdoc.unesco.org/images/0018/001891/189108e.pdf>.

³⁴ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 2.

³⁵ International Labour Organization, "Global Employment Trends for Youth 2013," 18.

³⁶ Ibid., 4.

³⁷ International Labour Organization, "Global Employment Trends for Youth 2012," 17.

³⁸ International Labour Organization, "Global Employment Trends for Youth 2013," 19.

Youth face an underdeveloped private sector and a growing informal sector. The Middle East has among the largest 15 to 24 year-old cohort in the world, at 21 per cent of the total population.³⁹ Although this represents an opportunity for economic growth, the private sector has not created the number of jobs needed in the region to meet this demand. As a result, young people with a university degree are more likely to be unemployed than their less-educated peers, or underemployed in the informal sector.⁴⁰ Informal employment in the Middle East, at about 67 per cent of the workforce, is higher than that in other middle income regions.⁴¹ As a result, young people in the Middle East are likely to enter the labour market through the informal sector, and then transition to public or private jobs.⁴²

Formal employment in the Arab States is strongly associated with public sector jobs. Young people are more likely to look for employment in the public sector because these jobs offer higher pay, better benefits, fewer working hours, and job security. However, jobs in this sector are contracting. Meanwhile new jobs available in the private sector are not filled as youth continue to pursue public sector jobs. Technical training in science, technology, and engineering is particularly needed in this region.⁴³

2.4.3 Central and South Eastern Europe and CIS

The overall youth unemployment rate for the region has fallen, but this decline masks disparities among and within countries. After reaching 20.4 per cent in 2009, the youth unemployment rate for the region has declined to 17.9 per cent in 2012.⁴⁴ In some countries the youth unemployment rate is very high (e.g. Armenia, 39.1 per cent). In other countries the situation has improved. For example, in Azerbaijan, youth unemployment has declined from 18.4 percent in 1999 to 11.0 per cent in 2010; in Turkey it fell from 25.3 per cent in 2009 to 17.5 per cent in 2012. Regional disparities are stark. In the Russian Federation, youth unemployment in Moscow was 5 per cent, compared to 51.3 per cent in Chechnya and 86.7 per cent in Ingushetia.⁴⁵

The situation of the youth labour market is in many ways different to that in Latin America and the Arab States. Instead of facing a growing youth and uneducated population, Central and Eastern Europe face a shrinking working age population due to emigration and poor health conditions.

Skills mismatches persist across many countries. “On the one hand, there are not enough jobs for young university graduates. On the other hand, there is high and unmet demand for technicians of all skills levels and for skilled blue-collar workers.”⁴⁶ The region has high numbers of university graduates in fields highly desired by employers today, like science, technology, and math.⁴⁷ This mismatch is demonstrated in surveys indicating high rates of employer dissatisfaction with the availability of skilled workers, 40 per

³⁹ World Bank, *The Road Not Traveled: Education Reform in the Middle East and North Africa*, Executive Summary, (Washington, D.C., 2007), 11.

⁴⁰ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 3.

⁴¹ World Bank. *Striving For Better Jobs: The Challenge of Informality in the Middle East and North Africa Region*. (Washington, DC: World Bank, 2011), <http://documents.worldbank.org/curated/en/2011/12/15572235/striving-better-jobs-challenge-informality-middle-east-north-africa-region>.

⁴² International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 5.

⁴³ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 5.

⁴⁴ International Labour Organization, "Global Employment Trends for Youth 2013," 17.

⁴⁵ Ibid., 17.

⁴⁶ Ibid., 17.

⁴⁷ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 5.

cent in one 2008 survey.⁴⁸ Educational achievement as measured by the Programme for International Student Assessment (PISA) indicates that the education system in this region is performing adequately at imparting basic skills, but is underperforming in higher order skills like problem solving or critical thinking, the very skills that firms increasingly seek.⁴⁹

2.4.4 Asia

Comparatively, the youth unemployment rate is lower in Asia than in other regions. South Asia (9.3 per cent) and East Asia (9.5 per cent) have the lowest regional youth unemployment rates, while South-East Asia and the Pacific had a slighter higher rate (13.1 per cent).⁵⁰

Young Asians face high poverty levels and a large informal sector. About 24 per cent of working youth in Asia live in poverty, and ILO estimates that 70 per cent of the working-poor youth are engaged in the agricultural sector.⁵¹ Jobs in this sector are usually informal, with no benefits, protection, and subject to abuse.

In China, rural/urban disparities exist in access to education. About 61 per cent of the 225 million people aged 15 to 24 in China live in rural areas.⁵² While half of youth in rural China complete lower secondary education or less, in urban areas young people have at least a high school education. As a result, 17 per cent of urban youth in China attend university, compared to 5 per cent of rural youth.⁵³

In India, the youth population suffers from low levels of education. On average, young people in India receive just over seven years of education. Moreover, there are wide disparities according to caste, class, and gender. For example, the wealthiest 20 per cent attend eleven years of school, whereas the poorest quintile averages only four years.⁵⁴ The education deficit is not filled by technical/vocational education and training as only 6 per cent of urban youth and 3 per cent of rural youth attend these institutions at the secondary level.⁵⁵

2.4.5 Sub-Saharan Africa

The youth unemployment rate in sub-Saharan Africa is 11.8 per cent with large variances in the continent.⁵⁶ Countries with the highest youth unemployment rates include South Africa, with over half of the youth population unemployed, Namibia (58.9 per cent in 2008), Reunion (58.6 per cent in 2011), and Lesotho (34.4 per cent in 2008).⁵⁷

⁴⁸ Lars Sondergaard and Mamta Murthi, "Skills, Not Just Diplomas, Managing Education for Results in Eastern Europe and Central Asia," (Washington, D.C.: The World Bank, 2012), 4.

⁴⁹ Ibid, 5.

⁵⁰ International Labour Organization, "Global Employment Trends for Youth 2013," 13-15.

⁵¹ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 10.

⁵² Ibid, 11.

⁵³ International Labour Organization, "China Youth Employment Report," (Geneva: ILO, 2005).

⁵⁴ UNESCO, *Education for All Global Monitoring Report 2010*, (Paris: UNESCO, 2010), www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/2010-marginalization/.

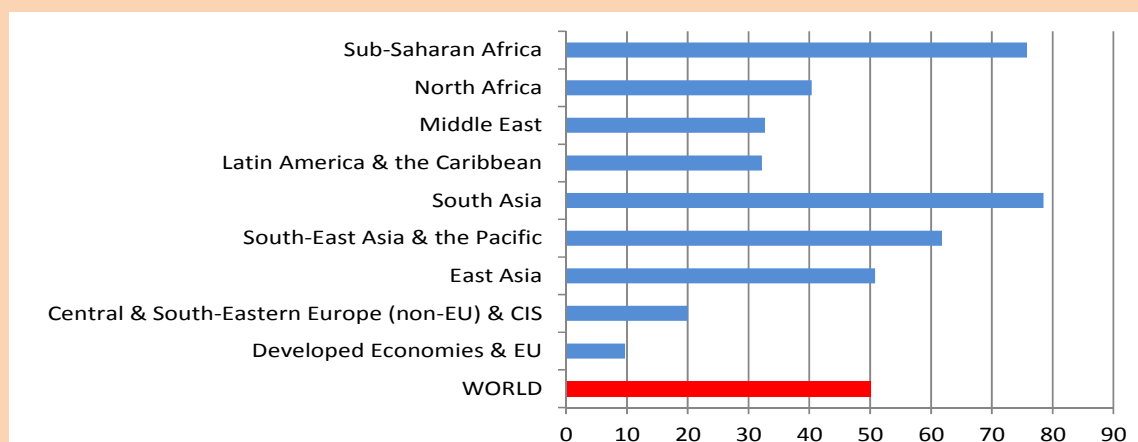
⁵⁵ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*, 12.

⁵⁶ International Labour Organization, "Global Employment Trends for Youth 2013," 20.

⁵⁷ Ibid., 20.

Africa has the highest rate of working poor, estimated at 40.1 per cent in 2012.⁵⁸ More than three out of four workers are engaged in the informal sector.⁵⁹ This is far high than all other regions except South Asia. As a result, African youth are typically found in vulnerable employment conditions. ILO estimates that an average of 2.1 million young people will be entering the labour market every year between 2011 and 2015, highlighting the need for new opportunities beyond the traditional sectors.

Figure 5: Informal sector employment shares, by region (2009)



Source: ITU World Telecommunication/ICT Indicators database

Educational attainment among youth is chronically low. In sub-Saharan Africa just 77 per cent of students enrol in primary education, the lowest in the world. The picture worsens as the education level increases. Only 41 per cent of boys and 32 per cent of girls in sub-Saharan Africa enrol in secondary education.⁶⁰ In the short-term, young people are likely to continue earning their living in the informal sector.

3 New employment opportunities – Macro sectors

The diffusion of ICTs is occurring across all economic sectors and job categories. In today's job market, basic ICT skills are considered essential for people entering the workforce and for those trying to find a better job. ICT skills are not only required for jobs in the information technology (IT) sector. The demand for them cuts across sectors—from agriculture and construction to education and service industries.⁶¹ Europe predicts that within five years, 90 per cent of all jobs will require technology skills across all sectors.⁶² While the percentage is undoubtedly lower in the developing world, the trend towards greater numbers of jobs requiring ICT skills is undeniable.

⁵⁸ Ibid., 20.

⁵⁹ International Labour Organization, "Global Employment Trends for Youth 2012," 26.

⁶⁰ UNESCO Institute for Statistics, "Global Education Digest 2011," (Montreal: UNESCO Institute for Statistics, 2011), www.uis.unesco.org/Education/Pages/ged-2011.aspx.

⁶¹ Maria Garrido, Joe Sullivan, and Andrew Gordon, "Understanding the Links Between ICT Skills Training and Employability: An Analytical Framework," *Information Technologies & International Development*, 8, no. 2, 2011.

⁶² European Commission, "e-Skills week 2012: There is a job waiting for you," http://europa.eu/rapid/press-release_IP-12-259_en.htm?locale=en.

This chapter explores how ICTs are transforming three sectors: agriculture, health and offshore services. These sectors were chosen to illustrate the range of changes brought about by ICTs, from agriculture, a traditionally manual labour-intensive sector that employs the majority of the developing world, to health, a sector that has witnessed some of the most profound changes as a result of ICT advances, to offshore services, a sector whose very existence was made possible by ICTs. As will be shown, ICT-related applications and innovations are generating oftentimes profound gains in efficiency and effectiveness, as well as ushering in entirely new opportunities.

ICT-led transformations of all workforce sectors should improve the employment and entrepreneurial prospects of youth with ICT skills. Within the sectors examined here, it is easiest to quantify the opportunities in the offshore services sector where the majority of employees are youth.

3.1 Agriculture

The agriculture sector is becoming more knowledge intensive, and as this trend intensifies so too do opportunities for ICT-related job creation. Upgrading workforce skills is becoming a key factor in the competitiveness of the agriculture sector. The increased complexity of the agriculture value chain, the enforcement of strict public and private industry standards and the growing competition among developing country suppliers, highlight the need for strategic investments in workforce development.⁶³

Timely access to information and communication allows farmers to cope with and even benefit from challenges like a growing population, constant price changes, climate change, or the integration of food markets. ICTs have found a foothold even in poor smallholder farms and in their activities.⁶⁴

Agricultural productivity is being boosted through the application of a variety of ICTs, including geographical information systems (GIS), wireless sensor networks, data mediation software, and short message service (SMS). At the same time, the expansion of telecommunication networks into rural areas is one of the main challenges for the sector.

Tools that help collect agricultural data are useful for yield technologies like improved seeds, crops developed through biotechnology, tractors, pesticides, fertilizers, and irrigation systems.⁶⁵ As agricultural innovation systems become more digital, there are growing opportunities to use ICTs to monitor them, track the interventions of numerous stakeholders in multiple processes, and evaluate system performance more effectively.⁶⁶

*The **Community Knowledge Worker (CKW)** programme is an initiative of The Grameen Foundation in Uganda that features a network of information intermediaries using mobile technology to deliver agricultural information and services to smallholder farmers. Services include agricultural tips and advice, weather forecasts, a market platform, and supplier directory, among others. The Grameen Foundation works with local agricultural research organizations and other experts to curate content and administer the services. Currently there are 98 CKWs operating in Eastern Uganda, with expansion plans underway for the coming three years.*

Website: www.ckw.applab.org

⁶³ Gary Gereffi et al., "Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries," (Duke University: Center on Globalization, Governance and Competitiveness (Duke CGGC), RTI International, 2011), 16.

⁶⁴ Tina George et al., "ICT in Agriculture: Connecting Smallholders to Knowledge, Networks, and Institutions," (Washington, D.C.: World Bank, 2011), 24, <http://documents.worldbank.org/curated/en/2011/11/16569539/ict-agriculture-connecting-smallholders-knowledge-networks-institutions>.

⁶⁵ Ibid., 109.

⁶⁶ George et al., "ICT in Agriculture: Connecting Smallholders to Knowledge, Networks, and Institutions," 139.

3.2 Health

Healthcare is a global multi-trillion dollar industry that is undergoing massive changes as a result of ICT-driven innovations. Unequal access to affordable and high-quality health services continues to be a critical challenge in many low and middle income countries. "Inefficient allocation of scarce resources and lack of coordination among key stakeholders have made duplication of efforts, overlapping responsibilities, and resource wastage common and troublesome problems."⁶⁷ As a result, policymakers are looking for innovative solutions to eliminate the geographical and financial barriers to healthcare. This search has triggered interest in using ICTs, and in particular mobile phones, to solve global health challenges.

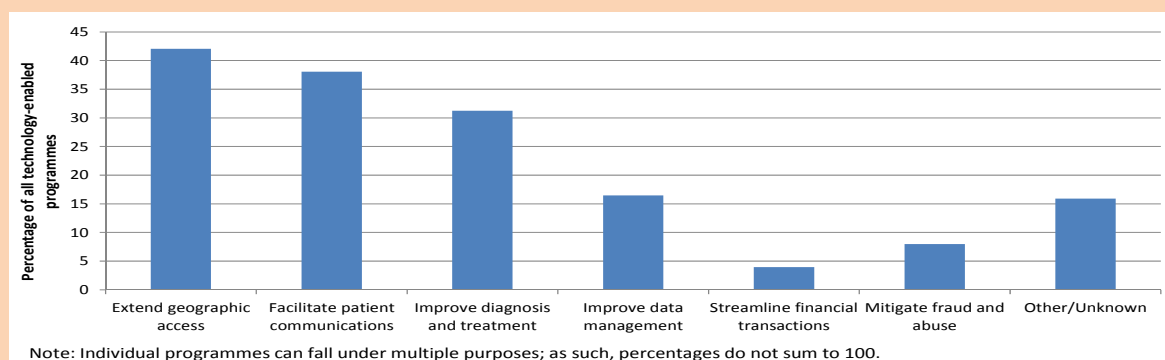
The World Health Organization (WHO), using data from the Center for Health Market Innovations (CHMI), analysed 176 programmes that use innovative solutions in global health. The analysis identified six key uses of ICTs in health:⁶⁸

1. Extend geographic access: In lieu of the traditional office, technology is used to videoconference with patients in rural areas and/or to instant message with a health practitioner for medical advice.
2. Facilitate patient communications: Technology is used to ease the flow of information between health workers and patients outside regular office visits.
3. Improve diagnosis and treatment: Technology improves clinical performance, allowing for real-time assistance during clinical decision-making and diagnosis.
4. Improve data management: Data collection and data analysis, particularly in remote areas, is eased by using devices like personal digital assistants that electronically collect information.
5. Streamline financial transactions: Using mobile phone applications, financial transactions are expedited between physicians and patients.
6. Mitigate fraud and abuse: Technology is used to verify a medical product, a patient identity, and/or a financial transaction.

⁶⁷ *infoDev*, "Improving Health, Connecting People: The Role of ICT in the Health Sector in Developing Countries," *infoDev* Working Paper # 7, 2006, 9, www.infodiv.org/articles/improving-health-connecting-people-role-ict-health-sector-developing-countries.

⁶⁸ World Health Organization. "E-health in low- and middle-income countries: findings from the Center for Health Market Innovations," Bulletin of the World Health Organization, 2012, 3.

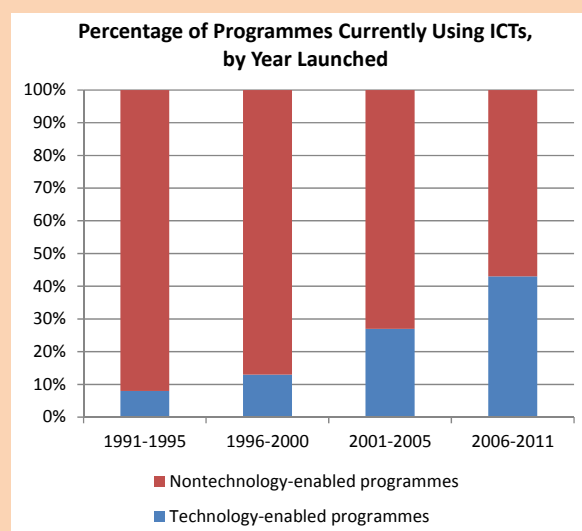
Figure 6: Technology-enabled programmes, by purpose



Source: World Health Organization, 2012

The WHO study further found that 27 per cent of the programmes profiled by CHMI featured ICTs in a prominent role. Technology solutions are emerging across all areas of health, led by HIV/AIDS, general primary care, and maternal and child care. Moreover, most of the technology-based solutions rely on mobile phones (63 per cent), computers (39 per cent), or both.⁶⁹ Text messaging services do not appear to be widely used. Programme implementers seem to prefer voice messages over text messages, especially if they are working with illiterate populations.⁷⁰

Figure 7: Percentage of programmes using ICTs, by year launched



Source: Authors

⁶⁹ Ibid.

⁷⁰ Ibid., 5.

The WHO study also reveals many programmes that face important barriers.⁷¹ Problems with end-user acceptance of the technology may be the result of lack of familiarity with the technology, a lack of cultural appropriateness, or a lack of incentive to adopt new tools. Electrical and internet infrastructure is sometimes lacking, explaining why some programmes prefer mobile phones over computers. Other barriers, like initial and on-going costs, are also impediments.

SMS for Life is a public-private partnership led by Novartis and supported by the Tanzanian Ministry of Health and Social Welfare, IBM, Medicines for Malaria Venture (MMV), the Swiss Agency for Development and Cooperation (SDC), Vodacom and Vodafone. The project is part of the global Roll Back Malaria Partnership.

SMS for Life relies on only a basic mobile phone to improve access to essential malaria medicines in rural areas of developing countries. It uses a combination of mobile phones, SMS messages and electronic mapping technology to track weekly stock levels at public health facilities. By doing this the program aims to reduce stock-outs, increase access to essential medicines, and thereby reduce the number of deaths from malaria. Results from pilot studies show dramatic decreases in stock-outs. SMS for Life has been rolled out to over 5 000 facilities in Tanzania, with new pilots and planning underway in Cameroon, Ghana and Kenya.

Website: www.smsforlife.com

3.3 Offshore services

Over the past two decades the offshore services industry has turned into one of the most dynamic sectors, employing directly about 4.1 million people around the world. The ICT revolution allowed the separation of production and consumption of services and the possibility for emerging economies to contribute for the first time to the world's services industry, changing the way companies do business. Skill-intensive activities, once performed by the developed world, now can be performed from any place. These services include information technology outsourcing (ITO), business process outsourcing (BPO), and knowledge process outsourcing (KPO) as well as industry specific services.^{72 73}

Offshore services are a potential vehicle for low- and middle-income countries to participate in the global knowledge economy.⁷⁴ This industry offers a good salary, career development opportunities for graduates and professionals, and the opportunity to incorporate into the labour market marginalized groups like rural women or unemployed youth. Offshore services can also be performed via microwork and crowdsourcing channels as described in the next chapter. The development of this sector has also created secondary effects like the demand for education useful to work in this sector. Therefore, besides creating a large number of direct jobs, it is estimated that an additional four indirect jobs are created for every offshore services job that is created.⁷⁵

⁷¹ Ibid., 6.

⁷² Gereffi et al., "Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries," 276.

⁷³ ITO is the basic building block for the offshore services value chain and is centred on the production and use of software. BPO is a diverse category that contains activities related to the management of enterprise resources (ERM), human resources (HRM), and customer relationships (CRM). KPO refers to specialized and high-value added activities that often require professional licensing, e.g. legal services.

⁷⁴ Gary Gereffi, "Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries," 140.

⁷⁵ Ibid., 141.

Firms or countries tend to follow any of the five following trajectories when establishing a niche in this sector:⁷⁶

1. Entering into the value chain: A common way through which an economy can enter the offshore services value chain is by establishing call centre operations. This creates an opportunity for low-income countries to enter the knowledge economy.
2. Upgrading within the business process segment: Companies that have established basic BPO operations, like call centres, can develop new higher value services. For example, firms can expand their call centres to include CRM management.
3. Offering full package services: Companies positioned in the ITO and KPO segments may opt to provide a more comprehensive range of activities and include BPO services.
4. Expanding IT firms into KPO services: IT companies may engage customers to find solutions for unsolved business problems.
5. Industry specialization: Companies offering some ITO, BPO, and KPO services for a wide range of industries can start specializing and focus on key high or low value industries to develop expertise.

A country aiming to enter the offshore services global value chain requires a workforce that has more than basic skills. Most workers are likely to require specialized training in order to fill the knowledge gap between local education systems and the high-quality standards required to serve the global market.⁷⁷ This includes training in English language as well as in new technologies and processes, the latter of which is obtained through global certifications in the ITO sector.⁷⁸

Dominican Republic, Guatemala, El Salvador

While countries such as India and the Philippines steal the headlines in the offshore services sector, many other countries have discovered tremendous opportunities as well. The Dominican Republic, Guatemala, and El Salvador, for example, have successfully implemented a “near-shore” concept, principally for the Hispanic market in the United States. This concept leverages these countries’ time zone proximity, cultural and language compatibility, as well as low costs. By 2010, the Dominican Republic, which entered the industry in the early 2000s, had achieved significant growth with 25 000 employees in 65 centres, compared to 9 000 employees each in El Salvador and Guatemala.⁷⁹ Since these countries principally serve the Hispanic market, the use of “Spanglish” by clients requires call centre agents to also understand English. Thus all three countries offer programmes to improve employees’ English competencies.

⁷⁶ Ibid., 150.

⁷⁷ Ibid., 277.

⁷⁸ Ibid., 278.

⁷⁹ Ibid., 169.

4 New employment and entrepreneurship opportunities – Emerging sectors

The increasing adoption of ICTs in everyday life, and the growing marketplace for digital goods and services, are creating opportunities for youth to find employment that transcend traditional paradigms. The way young people find and carry out work is changing. Instead of looking in the local newspaper, youth around the world browse web-based job listings to find work. Those with limited access to the internet carry out their job searches at public venues — telecentres, libraries, cybercafes — and many are even finding and carrying out work via their mobile devices. The very notion of the “work place” now reaches far beyond the local, which has great implications for young people that are challenged to find employment in their own communities. New approaches to outsourcing like crowdsourcing and microwork are providing young people worldwide with task- and project-based work opportunities-many of which are not restricted to highly skilled developers, but can also extend to semi-skilled and low-skilled workers with access to a relatively basic digital infrastructure.⁸⁰

The global increase in the use of mobile technologies is playing a key role in expanding employment opportunities for youth. Great potential for employment growth derives from a demand for services enabled by mobile phones.⁸¹ Young people can now find and carry out work, launch their entrepreneurial endeavours and even get paid via their cell phones. Young people are doing mobile microwork, and also being contracted to carry out market research in their own communities. Mobile financial services such as M-PESA⁸² are making it easier for young people to receive payment for services rendered and to launch their own entrepreneurial endeavours.

Given the growth in mobile phones, there is a lot of interest in mobile applications and how the emerging “app economy”⁸³ might generate new employment opportunities for young people around the world. Many young computer programmers are finding jobs working directly for software development firms. In addition there are opportunities for developers with entrepreneurial ambitions to start their own apps-based businesses.

This chapter explores a range of emerging opportunities involving ICTs and youth employment and entrepreneurship. First, the ways in which young people find work through digital job matching services is covered, followed by new opportunities for ICT enabled employment. The chapter then turns to the growing app industry, its potential for employment, and some of the issues related to becoming an app-based entrepreneur. This includes a need for people with skills to develop accessible software and websites for people with disabilities.

The fields of ICT repair, maintenance, and sales are also explored as they continue to be a source of employment for young people around the world. Lastly opportunities that green jobs may hold for youth are examined.

⁸⁰ Vili Lehdonvirta and Mirko Ernkvist. “Knowledge Map Of The Virtual Economy: Converting the Virtual Economy into Development Potential,” (Washington, D.C.: *infoDev*, 2011), 28, www.infodev.org/en/Publication.1076.html.

⁸¹ World Bank, *Information and Communications for Development 2012 Maximizing Mobile*, (Washington, D.C.: World Bank, 2012), 75, <http://go.worldbank.org/0J2CTQTP0>.

⁸² M-PESA (**M** for mobile, **pesa** is Swahili for money) is an innovative mobile transfer solution that enables customers to transfer money. It is aimed at mobile customers who do not have a bank account, either by choice, because they do not have access to a bank or because they do not have sufficient income to justify a bank account. Kenya is the 1st country in the world to launch M-PESA, which was done as a partnership between Safaricom and Vodafone.

⁸³ The app economy refers to the range of economic activity surrounding mobile applications. The app economy encompasses the development of and sale of apps, ad revenue or public relations generated by free apps, and the hardware devices on which apps are designed to run. www.techopedia.com/definition/28141/app-economy.

4.1 Online job services and job matching

While it may be common for skilled, educated workers to use existing web-based job-matching services to find job openings, many workers may not have access to job postings on the internet and may lack the social networks to find out about work opportunities. Searching for informal sector jobs often occurs through word-of-mouth, which limits people to their immediate social group. Employers may find it hard to identify lower-skilled workers for entry-level jobs in developing countries as many of the job matching services target more qualified candidates.

Mobile phones are becoming an important tool for job seekers and there are a number of job-matching services in the developing world that simplify the job search process. These services are proving to be very beneficial for people with basic literacies but who may not possess the knowledge to create a résumé or access online resources.⁸⁴

SoukTel's JobMatch Program connects thousands of job-seekers in the Arab States with employers who are looking for staff through an easy-to-use SMS and mobile audio technology. Employers enter job openings into SoukTel's database. Young job seekers use their mobile phones to create and update personal profiles in SoukTel's system. When position openings match job seekers' qualifications, they are notified via text message. SoukTel's mobile-based job search functionality is especially useful in the Middle East and Africa where young women may not have the same freedoms to seek employment through conventional means, and men largely dominate internet cafes.

Website: www.souktel.org

4.2 Microwork and crowdsourcing

As discussed in chapter 3, offshore services have turned into one of the most dynamic sectors employing people around the world. Since the first BPO call centres and data-processing facilities were established in India in 2000, the types, granularity, and coordination of outsourced tasks have evolved. In addition to voice and traditional data entry, coding, tagging, and text-based tasks can be broken down into small units that can be distributed globally. These new approaches to outsourcing are referred to as crowdsourcing and microwork.

Crowdsourcing is a process that involves outsourcing tasks or larger projects to a distributed group of people. This process can occur both online and offline. The difference between crowdsourcing and ordinary outsourcing is that a task or problem is outsourced to an undefined public rather than a specific group, such as paid employees.⁸⁵

⁸⁴ World Bank, *Information and Communications for Development 2012: Maximizing Mobile*, 75.

⁸⁵ "Crowdsourcing," *Wikipedia*, <https://en.wikipedia.org/wiki/Crowdsourcing>, accessed on December 3, 2012. See also Jeff Howe, *The Rise of Crowdsourcing* (Wired, 2006), www.wired.com/wired/archive/14.06/crowds.html

Figure 8: Crowdsourcing vs. Microwork**TABLE 8. Differences between crowdsourcing and microwork**

	Task size	Source of workers	Workers' tools	Skills
Crowdsourcing (Howe 2008)	From tiny tasks (2–30s) to large projects (days or weeks)	Open calls	Workers may require external tools	Basic computing skills to language skills and professional skills
Microwork	Tiny tasks (2–30s)	Open calls, staff members, subcontractors, BPO providers, online games	All tools and information embedded into worker's User Interface (UI)	Basic computing skills to language skills

Source: Author elaboration and Howe (2008)

Crowdsourcing

Crowdsourcing business models benefit individuals with higher-level technical skills. With some models, multiple workers complete a single task that has been broken down into small units (similar to microwork, see below). Other models are based on matching qualified workers with a particular project; workers will then complete the project individually or as part of a team. Most workers are compensated via electronic payment systems, such as PayPal. Crowdsourcing is becoming increasingly popular as a way for employers to instantaneously increase their workforce — without the investment and commitments associated with hiring full-time employees — though, as critics point out, this also enables companies to avoid providing social benefits such as healthcare for these workers. The Crowdsourcing Examples Wiki maintains a comprehensive list of businesses, sites, and forums that use crowdsourcing.⁸⁶

CrowdFlower

CrowdFlower is one of the largest crowdsourcing platforms, offering a range of services from product categorization and labelling for major online retail and auction sites like Amazon, eBay, and Taobao, to customer database management, to content creation. Human labelling of products and search results is time consuming, but the demand for it occurs in peaks and the work needs to be completed quickly in order to maximize sales. CrowdFlower uses crowdsourcing to harness a round-the-clock workforce that spans more than 70 countries, multiple languages, and can access up to half a million workers to dispatch diverse tasks and provide near-real time answers. Tasks are collated and checked for accuracy, and the results sent back to the customers. CrowdFlower was started in 2007 and is based in San Francisco.⁸⁷

Website: <http://crowdflower.com>

⁸⁶ Anjali Ramachandran, "Crowdsourcing Examples," <http://crowdsourcingexamples.pbworks.com> and [http://crowdsourcingexamples.pbworks.com/w/page/16668424/Individual businesses%20sites or forums that channel the power of online crowds](http://crowdsourcingexamples.pbworks.com/w/page/16668424/Individual%20businesses%20sites%20or%20forums%20that%20channel%20the%20power%20of%20online%20crowds).

⁸⁷ Lehdonvirta, and Ernkvist, *Knowledge Map Of The Virtual Economy*, 28.

Microwork

Microwork is a series of small tasks that have been broken out of a larger business process or project that can be completed via the internet or mobile devices. Microwork is considered the smallest — the most granular — unit of work in a virtual assembly line.⁸⁸ It also requires the lowest level of skills.

Microwork works in tandem with crowdsourcing. Granular tasks are distributed via “aggregators” to workers across geographic boundaries, using the internet or mobile phones. Workers are paid small amounts of money for completing each task. Microwork favours tasks that cannot be readily automated, and that can be completed in a few seconds by a worker without special skills or training, like tagging products on an e-commerce site.

Referred to as a kind of digital blue-collar work, microwork requires little training, and many microworkers are already located in the developing world. Microwork benefits workers in developing countries, especially women and young people who tend to experience higher unemployment and underemployment and could benefit from flexible income-generating opportunities.⁸⁹

The microwork market is growing rapidly. The World Bank estimates that the global microwork market generates between USD450 million to USD900 million annually, employing 1.45 million to 2.9 million microworkers. More than 1 million workers earned a total of USD 1 billion to USD2 billion in the past 10 years.⁹⁰

There are a number of organizations that are taking a “double bottom line” approach to microwork — employing people with limited opportunities for sustainable employment as principal workers in business process outsourcing centres to provide high-quality, information-based services to domestic and international clients. Often referred to as impact sourcing, the idea is to concurrently deliver value to businesses and jobs for those at the base of the pyramid.⁹¹ According to a study sponsored by the Rockefeller Foundation, it is estimated that impact sourcing may generate USD55.4 billion annually by 2020, and employ 2.9 million people — or nearly 25 percent of everyone working in a business process outsourcing enterprise.

There are other types of microwork initiatives as well, such as the m2Work challenge (named after mobile microwork) of the World Bank’s *infoDev* programme. The challenge is designed to encourage people to submit innovative ideas for microwork projects to aid digital job creation in developing countries. The m2Work challenge calls for participants to identify real-world problems that could be addressed by millions of underprivileged people equipped with internet-connected mobile phones. The motto of the m2Work challenge is: “From millions of tasks to thousands of jobs.” The winner of the first m2work challenge was *SRN: Smart Rickshaw Network* by Aadhar Bhalinge — a technology developer from India. His tool would crowdsource maps at a very low cost in developing nations by employing fleets of rickshaw drivers to feed live traffic updates into a subscription service. Second place went to Armenia’s Alexander Shakaryan, whose *MicroForester* app would aid reforestation projects.

⁸⁸ “Microwork,” *Wikipedia*, <https://en.wikipedia.org/wiki/Microwork>, accessed on December 3, 2012

⁸⁹ World Bank, “New Frontiers and Opportunities in Work. ICT is Dramatically Reshaping the Global Job Market” (ICT Policy Notes, World Bank, June 2012).

⁹⁰ Ibid.

⁹¹ Monitor Group, “Job Creation Through Building the Field of Impact Sourcing,” (Rockefeller Foundation, 2011), www.rockefellerfoundation.org/blog/job-creation-through-building-field.

***Samasource** is a non-profit organization that brings digital work opportunities to people around the world. Samasource secures contracts with companies including Google, Intuit, and CISCO; it has provided services to LinkedIn and the U.S. State Department, to provide data entry, digitization, content moderation, and other services. Component tasks (“microwork”) are distributed to the workforce, including 1 600 women and youth working with partner organizations in countries such as Haiti, Pakistan, and Uganda. Workers develop capacity, including computer skills and English.*

Website: www.samasource.org

4.3 Apps development

There is speculation regarding how the growing trend of apps development will generate new employment opportunities for young people around the world. The rapid rise of smartphones, tablets, and social media, and the applications-“apps”-that run on them, is one of the biggest economic and technological phenomena today. Since the iPhone was introduced in 2007, the app economy has generated roughly 752 000 app related jobs in the United States alone as of July 2013.⁹² The figure is 530 000 jobs in the 28 European Union countries.⁹³

Apps have inspired a new class of entrepreneurs, spawning a multibillion-dollar industry virtually overnight. The Apple App store eclipsed 1 000 000 apps in October 2013, double the number from two years earlier. The number of apps for Android has risen at roughly the same pace.

Games are still considered to be the most lucrative apps. Young people around the world aspire to cash in by creating the next Angry Birds. Interestingly, winners of Pivot East’s recent app competitions for the mobile and developer communities in East Africa have both been games-a Matatu racing game that has been downloaded 150 000 times in over 200 countries, and an action game application with an African jungle setting called Tough Jungle.

However, the verdict is out in terms of how sustainable the app economy will be, and whether it will produce enough revenue in emerging markets to support this new generation of entrepreneurs. Vision Mobile research shows that only a select few app developers in more mature markets are managing to make a living as app developers.⁹⁴

Sustaining an app in the market requires much more than developing it, launching it, and waiting for the profits to come in. It requires investment in constant development, upgrades, and new features. App stores are highly competitive and offering new features is essential to maintaining an app’s ratings and reviews.

Sizing the number of jobs generated by the app economy is difficult. Any particular app could be created by a single teenage programmer, or by a large team at a big company.

⁹² Michael Mandel, “752,000 App Economy jobs on the 5th anniversary of the App Store,” (Progressive Policy Institute, July 2013), www.progressivepolicy.org/2013/07/752000-app-economy-jobs-on-the-5th-anniversary-of-the-app-store/

⁹³ Andreas Pappas, “The EU App Economy: 530,000 jobs and rising,” (Vision Mobile, September 2013), www.visionmobile.com/blog/2013/09/report-the-eu-app-economy-530000-jobs-and-rising/

⁹⁴ Vision Mobile, *Developer Economics 2012: The New App Economy*, (June 2012) 4, www.visionmobile.com/blog/2012/06/report-developer-economics-2012-the-new-app-economy/.

Jobs in the app economy can be categorized as follows:

- IT-related jobs that use app economy skills—the ability to develop, maintain, or support mobile applications.
- Non-IT jobs (such as human resources or marketing) which support app developers in the same company.
- Jobs in the local economy that are supported by app developers.

The following is a list of types of app economy employers⁹⁵

- Large, medium, and small app developers, who may be creating apps for themselves or for clients.
- Media and software companies that engage in app development for consumer use under their own name.
- Finance and retail companies that use apps to reach customers.
- Other large non-tech companies that are developing apps for internal and customer use.
- Smaller non-tech firms who need a small number of app developers.
- Nonprofit organizations and government agencies, including the military, which require app developers to perform their functions.
- Support companies to help manage all the new technology.
- Large companies such as Amazon, Apple, Google, Microsoft, and RIM, who develop and maintain mobile app ecosystems/platforms.
- Large tech companies who develop essential infrastructure and complementary technologies for the app economy.
- Accounting and IT consulting firms, who provide app development as part of a larger suite of services.

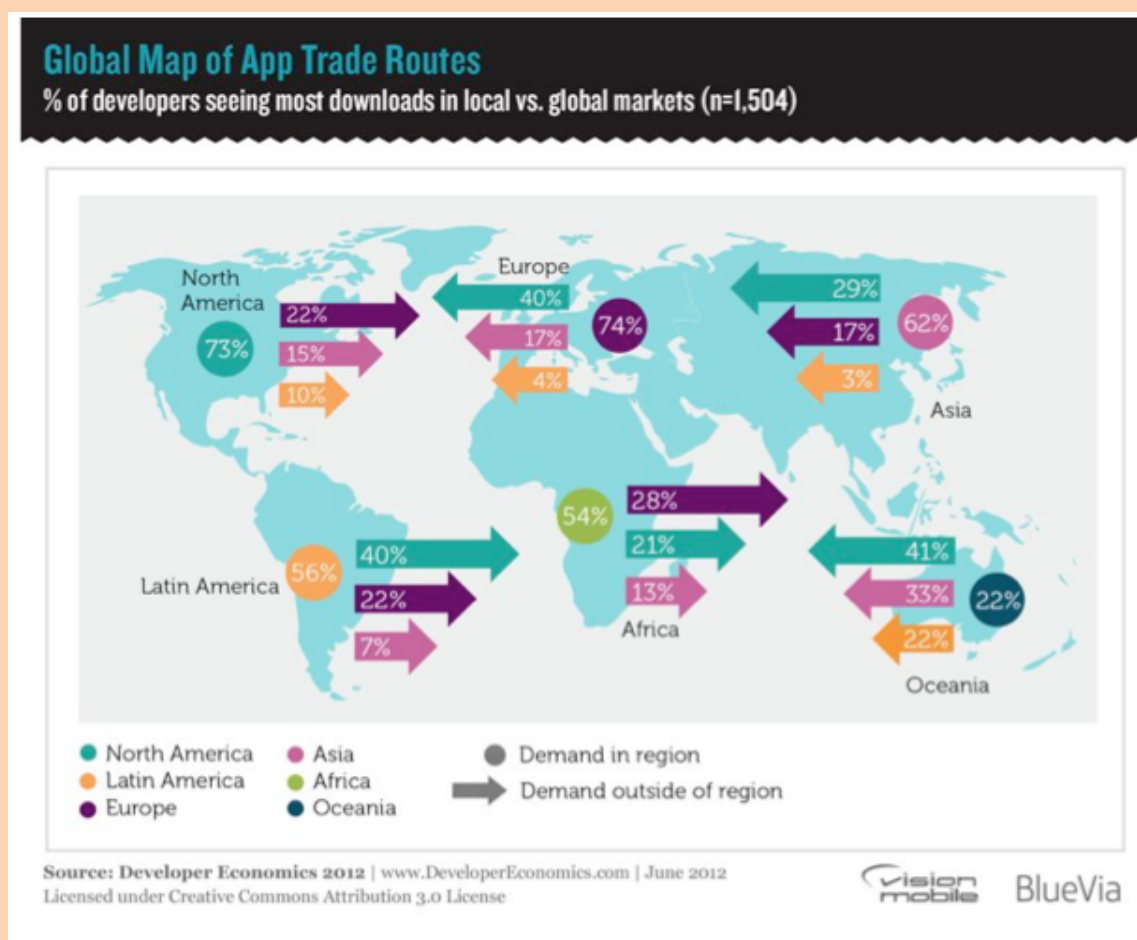
4.3.1 App demand in developing countries

While most attention to date has been on the potential for youth in developing countries to develop apps in English, it is believed that the next 10 million apps are not going to come from the current leading markets, but from the demand for localized apps in the developing world.⁹⁶ Developers in North America see relatively small demand from other regions, with Europe being their top export region (22 per cent of North American developers) but not far ahead of Asia (17 per cent). Latin America and Asia have a large share of developers (44 and 38 per cent respectively) that do not see high local demand—developers there mostly export apps to North America and Europe, where demand for apps, and paid apps in particular, is presently higher. For example, Figure 9 shows that only 56 per cent of the apps created in Latin America are downloaded locally, with 40 per cent being exported to North America, 22 per cent to Europe, and 7 per cent to Asia. However, it is expected that in a few years' time, local demand in these markets will reach the levels of local demand in Europe and North America, as smartphone penetration rises and people in these regions become more engaged.

⁹⁵ Mandel and Scherer, "The Geography of the App Economy," 15.

⁹⁶ Vision Mobile, *Developer Economics 2012: The New App Economy*, 73.

Figure 9: Global map of app trade routes



Source: Developer Economics 2012

For developers focusing on in-region, for-region development, the opportunity may lie in addressing market gaps in app categories in their own country. Opportunities exist for developers to produce apps that are relevant in terms of both local language and content. Emerging app economies have potential markets that are much larger than that of English speaking regions and Europe. Developers worldwide must close the language deficit by accelerating production of local language apps. These opportunities could be particularly strong in countries with large markets, rapidly increasing levels of user engagement and smartphone penetration as in Asia, Latin America, Eastern Europe, Russia and Africa.

4.3.2 Tech hubs for app development

One of the most exciting developments currently happening for tech entrepreneurs are the tech hubs springing up across the developing world. These incubation spaces are key to emerging digital economies because they solve a lot of the problems that young digital entrepreneurs face by providing connectivity, support structures, mentorship and collaboration.

For economic growth in the app economy, it is crucial for developers to be able to continuously update their technical skills, as well as to develop business and entrepreneurial skills. In response to demand by local mobile entrepreneurs, a number of incubators, or “labs,” focused on mobile entrepreneurs have been established over the last five years in emerging markets, including the Grameem Foundation’s Applabs in Uganda, Indonesia, Ghana and Colombia, and *infoDev* regional mobile applications laboratories, or “mLabs.”

The World Bank Bank's *infoDev* programme, in collaboration with the Government of Finland and Nokia, has established a network of five mLabs in Armenia, Kenya, South Africa, Pakistan, and Viet Nam. The mLabs are designed to help local entrepreneurs develop low-cost, demand-driven mobile applications. Each mLab is equipped with testing facilities for developing the technical skills and business sense needed to create mobile solutions that address social needs that could be scaled up into thriving businesses. In addition to providing state-of-the-art equipment, the labs offer technical training and workshops, as well as help developers and entrepreneurs to connect with potential investors, experts, and public sector leaders.

The mLabs are complemented by eight mHubs, which promote networking among stakeholder communities in the mobile industry; provide advice, mentorship, idea and product development competitions, and; offer access to investors through regular informal events and conferences. Both the mLabs and mHubs are managed and used by local communities working to increase the competitiveness of enterprises in mobile content and applications and are part of a wider mobile innovation programme, seeking to develop talent and produce successful companies with strong growth potential.

In addition to local incubators, there are now numerous regional competitions for app developers in emerging markets, many with a social agenda, that offer financial support and training for developers to use mobile platforms. For example, Apps4Africa features a competition where young companies are offered six minutes to demonstrate their app's utility, their business model and their case for investment. The competition targets start-ups and businesses through competitive funding, offering venture capital, mentorship and other forms of support. The goal for the 2012 competition was to catalyse the growth of Africa's early-stage start-ups to address the issue of youth unemployment across the continent.

In many developing countries where mobile phones are the primary means of accessing information via the internet, mobile apps that improve people's health, finances, and livelihoods hold great promise. Social intermediaries such as non-governmental organizations are playing an important role in customizing apps to meet the needs of local communities. It should be noted that some of those mobile services have not been "apps" per se, but aggregated services or lower tech solutions such as SMS or instant messaging.

4.4 Accessibility

Persons with disabilities number over one billion worldwide, or 15 per cent of the world's population. Bolstered by the UN Convention on the Rights of Persons with Disabilities and laws in many nations that have elevated the needs of persons with disabilities,⁹⁷ there is a rapidly growing need for people with the technical skills who can develop accessible software, websites, and other ICTs. Currently, however, there is a vast shortage of people with these skills. A coalition of technology firms is attempting to address this shortfall through the creation of the International Association of Accessibility Professionals. The association will produce educational materials for business leaders, designers, and software developers; administer professional accreditation certifications; elevate awareness of local and regional activities, and; build community and provide opportunities for accessibility professionals to engage with each other.⁹⁸

There are also numerous targeted efforts to spur the development of accessible ICTs. In Egypt, for example, the Ministry of Communications and Information Technology has held a contest to promote the development of accessibility mobile phone apps and other software applications, with the most recent

⁹⁷ In the United States, for example, Section 508 requires all public procurement of ICTs to be accessible to people with disabilities. This has led to all new ICT product releases in the U.S. with accessibility features built in.

⁹⁸ International association of accessibility professionals, www.accessibilityassociation.org

winners receiving incubation, financial, and other forms of support.⁹⁹ This is a model that many other countries can adapt as contests have become a very popular way to stimulate ICT innovations (see section 6.3).

These efforts are extremely important because they will improve the lives, and workforce participation opportunities, for a huge proportion of the population. “Accessible ICTs have the potential to provide persons with disabilities unprecedented levels of access to education, skills training and employment, as well as the opportunity to participate in the economic, cultural and social life of their communities.”¹⁰⁰ There are extensive examples of how persons with disabilities have used ICTs to enjoy meaningful employment, in many cases stimulated by initiatives and organizations focused specifically on empowering this population.

Perhaps the ICT of greatest interest to this community is the mobile phone, and in particular smart phones for such features as: hearing aid compatibility, open or closed-captioned multimedia content, video chat applications, screen reading applications, customized alert settings, voice-commands, adjustable font sizes, predictive text, and a range of other innovative features, accessories, and third-party applications.¹⁰¹

4.5 Gaming

Online games are an extremely popular sector of the entertainment industry and represent another significant source of digital employment for young people. Gaming platforms also rely on the outsourcing of small tasks through third-party gaming services like Crowdfunder. The gross revenues of the third-party gaming services industry were approximately USD3.0 billion in 2009.

Third party gaming services have enabled thousands of young people from modest backgrounds to create employment for themselves as digital entrepreneurs. An estimated 100 000 young, low-skilled workers in China and Viet Nam earn their primary income by outsourcing their services to gaming platforms.¹⁰² The third-party online gaming services segment consists mainly of activities known as “gold farming”¹⁰³ and “power-leveling.”¹⁰⁴ Both are essentially services where an online game player hires someone else to play the game on their behalf.¹⁰⁵ Players in more developed countries, wishing to save many hours of playing time, may be willing to pay gold farmers or power levellers to play for them.

An industry analyst has estimated that the near-term opportunities for further rapid online game market growth in East Asian developing countries are primarily located in Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam.

⁹⁹ See press release at www.mcit.gov.eg/Media_Center/Press_Room/Press_Releases/2585

¹⁰⁰ International Telecommunication Union. *The ICT Opportunity for a Disability-Inclusive Development Framework*; ITU, 2013, 3

¹⁰¹ Ibid., 11, International Telecommunication Union. *Making Mobile Phones and Services Accessible*, 2012

¹⁰² Lehdonvirta and Ernkvist. *Knowledge Map Of The Virtual Economy*, p51.

¹⁰³ Gold Farming refers to when individuals play a multiplayer online game to acquire in-game currency that other players purchase in exchange for real-world money. People in China and in other developing nations have held full-time employment as gold farmers.

¹⁰⁴ Power-leveling is using the help of another, stronger player in a role playing video game to level a character more quickly than is possible alone. A player may pay a company or individual to play and level-up their character. The customer provides the company with the username and password for their account, and the company assigns an employee to play the character for the customer until a desired level is reached.

¹⁰⁵ Lehdonvirta and Ernkvist. *Knowledge Map Of The Virtual Economy*.

4.6 Mobile phone repair and computer assembly

Mobile phone repair as well as computer maintenance and assembly continue to be important areas of youth job training and employment in many regions around the world. In cities throughout the developing world, the ICT and electronics markets where mobile phones are sold and repaired serve as many people's first interactions with technology as well as a huge source of employment and entrepreneurship. There are countless initiatives that offer youth skills training in device repair, local employment opportunities, as well as business training for local micro enterprises.

Action Technique pour un Développement Communautaire

Action Technique pour un Développement Communautaire (ATEDEC) is a project designed to educate orphans and vulnerable children in Rwanda in computer applications, maintenance, repair, and use of technological tools to help them create jobs and improve their livelihoods. ATEDEC focuses its efforts on youth in certain neighbourhoods of Kigali where many are suffering from unemployment, delinquency, and drug abuse. In partnership with a youth livelihoods programme called AKAZI KANOZE, youth are trained in computer maintenance and repair, as well as photography and design. They also provide training in entrepreneurial and financial skills. The programme reaches 100 young people per year.

Website: atedec.wordpress.com

4.7 Green jobs

There is increasing consensus in the development community that the global environmental crisis is an opportunity for employment in which ICTs and youth could play a major role. It is estimated that a shift to a greener economy could generate 15 to 60 million additional jobs globally over the next two decades and lift tens of millions of workers out of poverty.¹⁰⁶ A recent OECD report argues that promoting ICT skills in the green and smart economy pays a double dividend by encouraging job creation and accelerating the transition to green growth.¹⁰⁷ The ITU, as part of the Rio+20 conference, called for the identification of concrete targets and a specific roadmap for the utilization of ICTs as part of sustainable development strategies, as well as to mobilize the financial and human resources required to implement ICT strategies towards 'greener' and more resilient societies at the international, national and local levels.¹⁰⁸

The United Nations Environment Program's 2011 Green Economy Report makes the claim that economic progress and environmental sustainability can go hand in hand, and that the green economy will deliver green jobs and thus lead to decreased unemployment rates. The report states that key sectors will benefit the most from job creation, including forestry, agriculture, building, transport, services, administration and renewable energy.¹⁰⁹

¹⁰⁶ International Labour Organization, *Working Towards Sustainable Development Opportunities for Decent Work and Social Inclusion in a Green Economy*, (Geneva: International Labour Office, 2012).

¹⁰⁷ OECD, "ICT Skills and Employment: New Competences and Jobs for a Greener and Smarter Economy," OECD Digital Economy Papers, No. 198, (OECD Publishing, 2012), <http://dx.doi.org/10.1787/5k994f3prlr5-en>.

¹⁰⁸ Angelica Valeria Ospina, "The Outcome of Rio+20: An ICT Perspective on 'The Future We Want,'" *Notes on ICTs, Climate Change and Development*, <http://niccd.wordpress.com/2012/06/27/the-outcome-of-rio20-an-ict-perspective-on-the-future-we-want/>.

¹⁰⁹ United Nations Environment Programme, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, (Nairobi, Kenya: UNEP 2011).

Employment growth in the renewable energy sector alone is projected to be impressive for the coming decades. A UNEP report suggests that by 2030, given the increasing interest in energy alternatives, up to 20 million jobs could be created worldwide: 2.1 million jobs in wind energy production, 6.3 million in solar photovoltaic and 12 million in biofuels-related agriculture and industry.¹¹⁰

Although there is no common definition for green jobs, the OECD refers to them as “jobs that contribute to protecting the environment and reducing the harmful effects human activity has on it (mitigation), or helping to better cope with current climate conditions (adaptation)”.¹¹¹

4.7.1 Green jobs and ICTs

Data centres and other ICT infrastructures are increasingly vital for all sectors of the economy, and green growth strategies will require people capable of both greening ICT itself and helping ICT to make other activities greener. Some of the new jobs will be in the ICT sector, writing software or developing and manufacturing environmentally efficient semiconductors and other products for instance. Other green jobs will be related to greening the economy, such as working on the systems that operate wind farms, installing and maintaining the equipment that smart buildings use to control lighting and temperature, reducing emissions through ‘smart’ applications (e.g. smart logistics, smart buildings and smart grids).

Other areas of employment in the green economy that involve a range of ICTs from geographic information systems to satellite imagery and geospatial tools include:

- natural disaster management;
- precision agriculture;
- sustainable agriculture;
- natural resource management;
- waste management;
- energy efficiency;
- forestry;
- fishing;
- transportation;
- construction;
- urban planning.

In emerging economies and developing countries, the gains are likely to be higher than in industrialized countries, because the former can leapfrog to green technology rather than replace obsolete resource-intensive infrastructure. Brazil has already created just under three million green jobs, accounting for some 7 per cent of all formal employment.¹¹²

¹¹⁰ United Nations Environment Programme. “Green Economy, Renewable Energy: Investing in Energy and Resource Efficiency,” (UNEP, 2011).

¹¹¹ OECD, “ICT Skills and Employment: New Competences and Jobs for a Greener and Smarter Economy.”

¹¹² United Nations Environment Programme, “Transition to Green Economy Could Yield up to 60 Million Jobs,” UNEP News Centre, May 31, 2012, www.unep.org/newscentre/default.aspx?DocumentID=2683&ArticleID=9145.

4.7.2 Green jobs for youth

The dialogue around ICTs and the green economy has centered largely on food security, sustainable agriculture, and energy efficiency. Interestingly, youth participation in the green economy has not been an area of focus; however in the context of the 2012 Rio+20 conference on sustainable development, youth advocacy groups lobbied that young people should be seen as an asset for a green economy that would in turn generate youth employment.¹¹³

Youth have expressed a strong interest in renewable energy and fighting climate change as evidenced in local, regional and international youth climate movements.¹¹⁴ Many surveys of youth show their desire to create green jobs for the future.

“Brazil discovered the pre-salt in its coast, and needs green technology to [...extract it] and to avoid environmental problems. As we [also] have one of the biggest forests in the world, youth and young students from some universities are preparing for the [expansion of...] green jobs to increase our employment and youth employment rates.”¹¹⁵

Paulo, YMCA volunteer

Upgrading youth ICT skills will be a key factor in their ability to participate in and benefit from the green economy. In addition to jobs that require higher education such as engineering, the pervasive use of ICT applications from web portals, text messages (SMS), mobile phone based monitoring systems, community mapping and social media tools are offering new ways that young people can play a role in “smart” energy-efficient economic growth, and environmental protection.

5 ICT employability skills

What skills are required to take advantage of the opportunities described in this report? As shown, there is a wide range of ways that ICTs are revolutionizing all sectors of the economy and creating new avenues for starting a business. The popularization of Web 2.0, social media, mobile apps, and other ICT advancements have dramatically changed the playing field. With these changes there has arisen the need to re-think and update the types of ICT and ICT-related skills that are required to succeed in today’s world. Being “computer literate” – having the skills to perform basic computer operations – used to be sufficient for most jobs entailing use of computers. While this may still hold true in some cases, basic computer literacy is not sufficient to pursue the majority of new opportunities described in earlier chapters. To respond to these changes, experts have developed new literacy frameworks in order to describe and delineate other types of ICT skills. These go by such names such as digital literacy, information literacy, ICT literacy, media (or multimedia) literacy, and web literacy, among others. New curricula and training programs have emerged to cover the broader set of skills contained within these new frameworks.

This chapter begins with a look at the evolution from computer to digital literacy, the latter widely recognized as a more comprehensive and relevant inventory of the range of ICT-related skills needed for success in career and life. Next, the concept of web literacy is explored, exemplifying new thinking around

¹¹³ Youthpolicy.org, www.youthpolicy.org/blog/category/rio-2012/.

¹¹⁴ Michael Davidson and Kyle Gracey. “Green Jobs for Youth,” 2011, <http://switchboard.nrdc.org/blogs/mdavidson/YouthGreenJobs%20-%20Gracey,%20Davidson.pdf>.

¹¹⁵ UN Focal Point on Youth, “What Are the Up-and-Coming Areas for Youth Employment in Your Country?” UN World Youth Report Website, last modified on December 29, 2011, www.unworldyouthreport.org/index.php?option=com_k2&view=item&layout=item&id=23&Itemid=128

a variation of ICT skills that is becoming increasingly important for some careers. Finally, the report describes the complementary skills that, in combination with ICT skills, are deemed necessary for employment.

5.1 Computer literacy

Computer literacy “refers to the ability to use computers and related technologies, from end-users to ICT professionals. It is generally understood as the knowledge and skills needed to effectively use hardware and software components.”¹¹⁶

Basic computer skills include (sample):

- turning a computer on and off;
- using a mouse and keyboard;
- understanding basic computer terminology and concepts;
- understanding operating system, programmes, and data;
- managing files.

Intermediate computer skills (sample):

- performing basic functions of common productivity programmes (word processing, spreadsheet, presentation);
- using email and web browser;
- installing software and hardware.

Advanced computer skills (sample):

- programming;
- using advanced features of productivity programmes;
- fixing simple computer problems.

Computer literacy at the intermediate level is becoming required for almost every job. In the health sector discussed in Chapter 3 for example, hospital employees must be able to use medical records systems, order supplies, manage appointments and perform other routine tasks on a computer that used to be done on paper. Even in many jobs that do not entail contact with a computer employers are screening for basic computer skills as a minimum qualification for employment.¹¹⁷ An increasing number of non-IT positions also expect people to have more advanced skills, such as basic trouble-shooting and using advanced features in productivity programmes, though IT professionals are can still be relied upon for most advanced functions.

¹¹⁶ European Commission, "Digital Competence in practice: An analysis of frameworks," (European Commission, Joint Research Centre IPTS, 2008).

¹¹⁷ Author Chris Coward's interviews in southern Viet Nam of several light manufacturing facilities revealed that employers required job applicants to have computer skills even though they would not use computers in their tasks.

5.2 Digital literacy

Most of today's attention around ICT skills is focused on the concept of digital literacy. Being digitally literate refers to the ability to effectively and critically navigate, evaluate and create information using a range of digital technologies. The Institute for Prospective Technological Studies (IPTS), a research centre of the European Commission, has undertaken extensive work around digital literacy. In its 2013 report they propose a comprehensive framework that exemplifies the types of competencies many experts note are required to be digitally literate.¹¹⁸

Figure 10: Digital competence framework

Dimension 1 Competence areas	Dimension 2 Competences
1. Information	1.1 Browsing, searching and filtering information 1.2 Evaluating information 1.3 Storing and retrieving information
2. Communication	2.1 Interacting through technologies 2.2 Sharing information and content 2.3 Engaging in online citizenship 2.4 Collaborating through digital channels 2.5 Netiquette 2.6 Managing digital identity
3. Content creation	3.1 Developing content 3.2 Integrating and re-elaborating 3.3 Copyright and licences 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data 4.3 Protecting health 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Innovating and creatively using technology 5.4 Identifying digital competence gaps

Source: Institute for Prospective Technological Studies¹¹⁹

As shown above, the framework is divided into five competence areas, each with a set of three to six competences. There are important distinctions between this and other digital literacy frameworks and those focused on computer literacy. First, digital literacy frameworks are typically more explicit about the breadth of life purposes for which being digitally literate is necessary. The IPTS framework, for instance, articulates the following life activities: leisure, social, buying and selling, learning, citizenship, well-being, and employability. The list above illuminates this tendency with the inclusion of such competences as netiquette, engaging in online citizenship, protecting personal data, and so on. In this way digital literacy frameworks adopt a holistic approach, recognizing the deeply embedded nature of technology in all aspects of life.

¹¹⁸ European Commission, "DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe," (JRC IPTS, European Commission, 2013).

¹¹⁹ *ibid.*, 12.

Second, being digitally literate involves much more than having technical skills. In the IPTS framework, each competence articulates knowledge and attitudes in addition to skills that are required. Figure 11 illustrates this with competence 2.4: *Collaborating through digital channels*.

Figure 11: Collaborating through digital channels

Knowledge examples	<p>Knows that collaborative processes facilitate content creation</p> <p>Knows when content creation can benefit from collaborative processes and when not</p> <p>Understands the dynamics of collaborative work and of giving and receiving feedback</p>
Skills examples	<p>Is able to use the collaborative features of software packages and web-based collaborative services (e.g. track changes, comments on a document or resource, tags, contribution to wikis, etc.)</p> <p>Is able to give and receive feedback</p> <p>Can use social media for different collaborative purposes</p>
Attitude examples	<p>Is willing to share and collaborate with others</p> <p>Is ready to function as part of a team</p> <p>Seeks new forms of collaboration that are not necessarily based on a previous face-to-face engagement</p>

Source: Adapted from European Commission, 2013¹²⁰

Finally, for the purposes of this report, it is important to call attention to the employability purpose. Each of the 21 competences contains examples of its relevance to people in typical work situations. Remaining with the example of *collaborating through digital channels*, a person with advanced skills would have the following ability:

“I have created a draft project document on finance, and put it into an online collaboration tool, so that the others working on it with me can amend it and add to it. The system will alert me to the changes when these are being made, so that I can collaborate with them synchronously if I wish.”¹²¹

Also of note is the inclusion of the competence area called *problem solving*. According to the IPTS report, this area was developed because of its particular relevance for employability. It emphasizes the need for users of technology to remain constantly aware of the changing technology landscape, and to take responsibility for knowing when and how to upgrade one’s skills. This has strong implications for lifelong learning and ensuring people have multiple avenues for acquiring new skills, as explored in depth in Chapter 7.

¹²⁰ European Commission, “DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe,” (JRC IPTS, European Commission, 2013), 22-23.

¹²¹ Ibid., 23.

All of these distinctions have important implications for digital literacy training. It is more challenging to develop all-encompassing curriculum and foster attitudes towards technology than it is to teach specific skills. The next two chapters will cover programs and resources that are built on this more expansive understanding of what it means to be digitally literate.

5.3 Web literacy

While digital literacy may be the most established concept, other efforts have also emerged that reflect differing philosophies of how the internet should be maintained, as well as different skillsets. The concept of web literacies is worth discussing in this context. Advanced by the Mozilla Foundation in collaboration with global experts, web literacies refers to “not only being able to read the web but also having the ability to ‘write’ it. Writing the web – creating pages, documents and multimedia assets – means understanding the building blocks of the web. As Mitchell Baker (Chairperson of Mozilla) says, we want to move beyond ‘elegant consumption’ towards creating a generation of Webmakers. We’re not talking about everyone becoming a fully-fledged programmer, but we do believe that everyone should have the skills, competencies and literacies to be able to tinker and make things with and on the web.”¹²²

¹²² Doug Belshaw, "Working towards a framework to understand the skills, competencies and literacies necessary to be a Webmaker," Mozilla Foundation, <http://mzl.la/weblit>.

Figure 12: Web skills / Competencies / Literacies grid

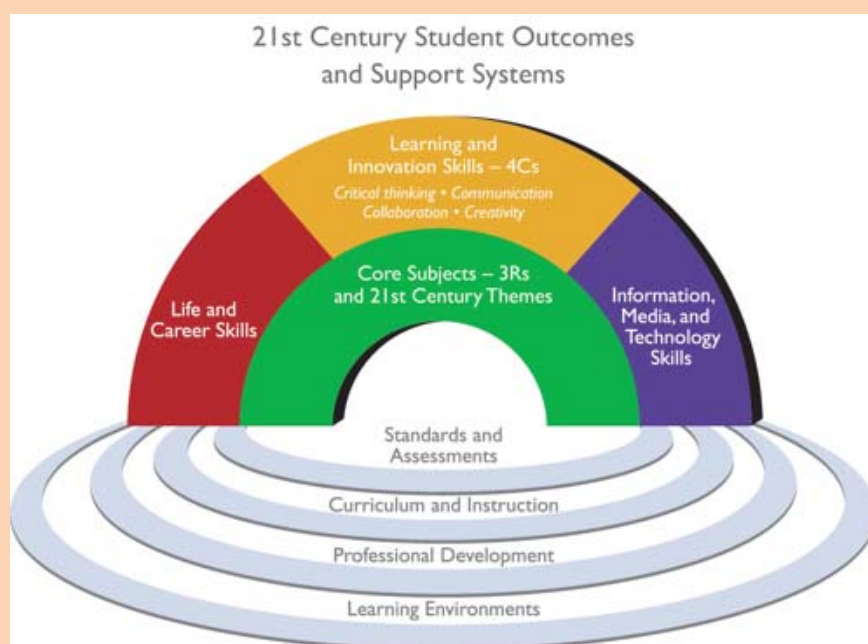
EXPLORING	CREATING	CONNECTING	PROTECTING
BEGINNER			
Browser basics (e.g. URLs, copy/paste)	HTML basics (e.g. adding images, linking)	Participation (e.g. etiquette, curation)	Privacy (e.g. cookies, privacy controls)
Search engine basics (e.g. keyword search, filtering)	CSS basics (e.g. fonts, positioning)	Collaboration (e.g. co-creation, wikis)	Security basics (e.g. HTTPS, password management)
Web mechanics (e.g. view source, hyperlinks)	Web design basics (e.g. affordances of the web, designing for audiences)	Sharing (e.g. social networks, embedding)	Rights online (e.g. copyright, open licensing)
INTERMEDIATE			
Browser skills (e.g. cookie management, add-ons)	Javascript basics (e.g. programming basics, javascript syntax)	Contributing to web communities (e.g. distributed working, collaborative curation)	Identity (e.g. personal information curation, tracking management)
Credibility (e.g. trustworthiness of websites, evaluating information)	Advanced web design (e.g. responsive design, accessibility)	Storytelling (e.g. multimedia, augmentation)	Security & encryption (e.g. data protection, basic encryption)
Remixing (e.g. mashups, hackable games)	Infrastructure (e.g. hosting, domains)	Open practices (e.g. open standards, open source)	Legalese on the web (e.g. privacy policies, terms of service agreements)

Source: Mozilla Foundation¹²³¹²³ Ibid.

5.4 Complementary skills

The discussion in this chapter so far has focused on the ICT-related skills required for meaningful participation in society as well as work. Beyond these technical skills, many initiatives and organizations have recognized the need for people to have a set of complementary soft skills to become more employable. The Framework for 21st Century Learning, produced by the Partnership for 21st Century Skills, articulates the key elements needed to ensure people are equipped for lifelong success. Among other features, it depicts the close and symbiotic relationship between ICT-related skills and these other skills.

Figure 13: Partnership for 21st Century Skills Framework



Source: Partnership for 21st Century Skills¹²⁴

As shown in Figure 13, in addition to the standard core subjects (the 3Rs of reading, writing, and arithmetic), the other three outcome areas are: life and career skills; learning and innovation skills, and; information, media and technology skills. The latter has been addressed in detail above. The contents of the other two areas deserve elaboration because of their relevance to employability. They are:

Life and career skills:

- flexibility and adaptability;
- initiative and self-direction;
- social and cross-cultural skills;
- productivity and accountability;
- leadership and responsibility.

¹²⁴ Partnership for 21st Century Skills, "P21 Framework Definitions," Last modified December 2009, www.p21.org/storage/documents/P21_Framework_Definitions.pdf.

Learning and innovation skills:

- creativity and innovation;
- critical thinking and problem solving;
- communication and collaboration.

The following chapter shows that many of these soft skills are also essential for entrepreneurs.

Finally, many organizations that provide employability training have developed a range of complementary services aimed at improving the employment prospects of their clients. These services include:¹²⁵

- CV preparation;
- job counselling;
- employee connection services;
- information on local labour markets;
- sector-specific training, often in collaboration with industry;
- language training, especially English.

6 Entrepreneurship skills and support

It is widely recognized that entrepreneurship is a necessary ingredient for stimulating economic growth and employment opportunities around the world. In developing countries successful small businesses are the primary engines of job creation, income growth, and poverty reduction. The Global Entrepreneurship Monitor (GEM) estimated that 388 million entrepreneurs were actively engaged in starting and running new businesses in 2011 around the globe, and 165 million of them were young early-stage entrepreneurs between the ages of 18 and 35.¹²⁶ Considering staggering global youth unemployment levels, much hope for youth lies in their ability to become job creators rather than job seekers.

This chapter addresses the skills and attributes necessary to become an entrepreneur, and the types of support needed to foster young entrepreneurs. More examples of the programs designed for these purposes can be found in the accompanying resource database.

Entrepreneurship, Emprendimiento, Ujasiriamali

The importance of entrepreneurship is being elevated around the world. Governments, multinational corporations, and NGOs are joining forces to promote entrepreneurship as a strategy for economic development. It is becoming easier for entrepreneurs to find the information they need to start their own businesses, and an increasing number of government initiatives are helping to make the process quicker and less costly.¹²⁷ Startup Africa, StartUp America, StartUp UK, and StartUp Chile are but a few examples of the new national priority that governments are assigning to entrepreneurship. Over 120 countries now participate in Global Entrepreneurship Week activities promoted by the Kauffman Foundation. As a result, young people everywhere are participating in pitch fests, competitions, startup events and other activities sponsored by local governments, NGOs and the private sector.

¹²⁵ Maria Garrido and Nancy Garland, "e-Skills and employability: A learning and networking event for NGOs. Workshop Report, Barcelona, June 2007," (Seattle: Technology & Social Change Group, 2007), <http://hdl.handle.net/1773/16291>.

¹²⁶ Global Entrepreneurship Monitor, "2011 GEM Global Report." It should be noted that the GEM surveys entrepreneurs 18-64 of age.

¹²⁷ World Bank. *World Development Report 2013: Jobs*.

Business incubators and accelerators are emerging around the world seeking to emulate the successes of Silicon Valley. Wired Magazine likens the opportunities in Africa to those of the pre-dotcom boom in 1995.¹²⁸ Referred to as the “Silicon Savannah,” Kenya has become a new hotbed for innovation, startups, and app creation. Household tech names such as Google, Intel, Microsoft, Nokia and Vodafone all have a presence there, and IBM recently chose Nairobi for its first African research lab. Nigeria is becoming known as the “Silicon Lagoon” with important outside investors showing interest in their local startups and large market potential. Amman, Jordan has been dubbed Silicon Wadi (Arabic for valley). Latin America is also experiencing a boom of start-ups, business accelerators and incubators.¹²⁹

While the excitement around entrepreneurship is unmistakable, it is also important to temper expectations as there is no definitive evidence that entrepreneurship will solve the job situation faced by youth in the developing world. It is early days, and proper assessments of programmes and initiatives are required further down the line.

Becoming an entrepreneur is the result of a personal decision-making process that entails an assessment of opportunities and costs (being employed, being unemployed, being one’s own boss), and risk-reward relationships (what is at stake), among other factors. Values, beliefs and behaviours that are embedded in the local culture influence this decision.

Entrepreneurship education and start-up support contribute to the creation and development of entrepreneurial attitudes, motivations and skills needed to successfully run and grow a business.¹³⁰

6.1 Entrepreneurship skills

Many factors are required for successful entrepreneurship. Most important are entrepreneurship skills and competences.¹³¹ Motivated people need the right set of skills to identify entrepreneurial opportunities and to turn their entrepreneurial projects into successful ventures. Becoming familiar early with the idea that running one’s own firm can be a potential career option is important, and education has a core function in this.

In addition to the employability skills listed in chapter 5, there are a number of entrepreneurial skills that are key to helping young people create employment opportunities for themselves and their communities.

¹²⁸ David Rowan, “Want to become an Internet billionaire? Move to Africa,” (*wired.com.uk*, November 4, 2011), www.wired.co.uk/news/archive/2011-11/04/get-rich-move-to-africa.

¹²⁹ Anna Heim, “9 Latin American Accelerator Programs You Should Know,” (*thenextweb.com*, July 29, 2011), <http://thenextweb.com/la/2011/07/29/9-latin-american-accelerator-programs-you-should-know/>.

¹³⁰ Andrea-Rosalinde Hofer and Austin Delaney, “Shooting for the Moon: Good Practices in Local Youth Entrepreneurship Support,” (OECD Local Economic and Employment Development (LEED) Working Papers 11, 2010), www.oecd-ilibrary.org/content/workingpaper/5km7rq0k8h9g-en.

¹³¹ Ibid.

Figure 14: Core entrepreneurial skills and attributes¹³²

SKILLS	ATTRIBUTES
<ul style="list-style-type: none"> management skills – the ability to manage time and people (both oneself and others) successfully communication skills (e.g. the ability to sell ideas and persuade others) networking – make contacts and build social capital language skills – mainly English* ability to collaborate with a team critical thinking, problem solving and independent decision making ability to plan, coordinate and manage effectively financial literacy commercial awareness ability to research and synthesize information (e.g. markets, suppliers, customers and the competition) negotiation 	<ul style="list-style-type: none"> leadership self-motivation and discipline adaptability ability to multi-task ability to take responsibility and make decisions ability to work under pressure perseverance competitiveness self-confidence in uncertainty willingness to take risks

* English continues to be recognized as key for conducting business and securing investors. The largest outsourcing markets are also English speaking.

Business Training is Vital

Entrepreneurs cannot rely on ambition and innovation alone. Basic business training is extremely important for entrepreneurs.

“Not every app is a business, and not every iHubber¹³³ with a laptop is an entrepreneur. Technology in itself isn’t a business yet. If you want to be a start-up, then you need to think about it in a bigger context. Your app, website or other idea may be great, but if you don’t understand marketing, if you don’t understand how to build a company around it (or how to find people who can do this), then you probably won’t get very far.”¹³⁴

Entrepreneurs need to be able to:

- register their businesses;
- create business plans;
- develop revenue and funding models;
- market and sell a new product or idea;
- gain financial skills, such as book-keeping, financial reporting and filing taxes;
- understand issues of design, intellectual property, and patent law.

¹³² Adapted from: www.bioscience.heacademy.ac.uk/resources/entrepreneurship/skills.aspx

¹³³ An “iHubber” is a person who frequents the IHub co-working space and business incubator in Nairobi, Kenya.

¹³⁴ Andrea Bohnstedt in “Silicon Savannah: Hype or Reality? A recap of last week’s event,” *I-Hub Blog*, October 23, 2012, www.ihub.co.ke/blog/2012/10/silicon-savannah-hype-or-reality-a-recap-of-last-weeks-event/.

Important skills for digital entrepreneurs

In addition, digital entrepreneurs also require skills in a variety of areas related to business communications, customer relation management, finance and systems management, as shown below.

Operations and management:

- scheduling
- contact management
- information management
- project planning

Finance:

- common financial documents
- expense tracking
- cash flow analysis
- financial accounting

Communications:

- email (and managing mailing lists)
- presentations
- virtual collaboration

Research:

- ability to find and assess information
- using online and personal networks
- due diligence, market research

Marketing:

- managing online identity
- print
- digital images
- electronic marketing
- social media skills: blogging, social media management
- basic understanding of search engine optimization (SEO)¹³⁵

Technology management:

- picking the right management information system (MIS)
- ability to assess rapidly changing technology tools
- integrating technology tools into business operations
- software updates
- data security and management

6.2 Mentoring and networking

ICT entrepreneurs identify their greatest needs as start-up capital and opportunities to network with business people and other technology entrepreneurs. There are an increasing number of initiatives under way around the world designed to help young ICT entrepreneurs obtain professional advice to refine their business ideas and secure funding through investors and contests.

Mentorship is considered crucial for young entrepreneurs to survive and grow in the competitive ICT marketplace. A good business idea and business leads alone do not create sustainable entrepreneurs. Networking with local business professionals can enhance the incubation experience, providing entrepreneurs with highly customized business planning and strategy that can accelerate the growth of their businesses.

In cases where ICT students graduate with the skills to be developers, most of these students lack the basic business skills needed to get an idea off the ground. They are developers, not CEOs.¹³⁶ As a result, mentorship is perceived as the fundamental component needed to close the developer-entrepreneur gap.

¹³⁵ Search Engine Optimization (SEO) involves the implementation of techniques and tactics used to increase the amount of visitors to a website by obtaining a high-ranking placement in the search results pages of internet search engines such as Google, Firefox, Yahoo and other search engines. SEO helps to ensure that a site is accessible to a search engine and improves the chances that the site will be found by the search engine.

¹³⁶ Jonathan Kalan, "Why Jordan Looks More Like Kenya than Silicon Valley," (*wamda.com*, November 21, 2012), www.wamda.com/2012/11/why-jordan-looks-more-like-kenya-than-silicon-valley.

MicroMentor is an initiative of the nonprofit humanitarian agency Mercy Corps that offers free online guidance to entrepreneurs and connects them with business mentors. Services are provided to entrepreneurs, particularly those with low incomes and limited access to business resources, in the United States as well as Nicaragua and Haiti. To find a mentor, you create a brief profile and a specific mentoring request on their website. The request is then listed in the mentoring opportunity database, where volunteer mentors can offer to help. Help can also be requested from specific mentors. The website has more than 3 500 entrepreneurs and 2 600 business mentors enrolled, and it has made more than 2 250 matches. Volunteer mentors can also sign up on the website. MicroMentor reports that participating businesses had a 75 per cent increase in median annual business sales and an 87 per cent survival rate year over year.

Website: www.micromentor.org

Social networks are important sources of community support and can provide access to capital, skills, distribution channels, and qualified peers to start new business activities. “Informal social networks, consisting of acquaintances, investors as well as other mobile entrepreneurs, or peers, serve three distinct purposes in the development of new ventures— discovering opportunities, securing new resources, and obtaining legitimacy—all of which are necessary for the survival of a young firm.”¹³⁷

Recognizing the importance of networking, many initiatives have emerged featuring regular in-person events. These events bring together entrepreneurs, developers, investors, industry representatives, and others to allow people to share ideas, discuss trends, and pitch products and services. Mobile Monday is one of the most prominent examples, founded in 2000 and currently with chapters in 140 cities around the world.¹³⁸

Many events are regional, such as Caribbean Beta, which brings together the Caribbean’s technology and entrepreneurship communities. Many organizations also sponsor networking events, such as pitch fests¹³⁹ and BarCamps,¹⁴⁰ further underscoring the critical role of face-to-face interaction. As one participant in an event in Africa reports, “within the South African camp, many new friendship and future potential working relationships were made. Being surrounded by many like-minded entrepreneurs is a perfect breeding ground for new ideas and business ventures to be conceived.”¹⁴¹

6.3 Crowdfunding, contests, and other sources of capital

Funding is crucial to nearly every start-up. Once mostly limited to entrepreneurs in the developed world, and in particular to regions such as Silicon Valley and its equivalents in other parts of the world, today there are new mechanisms for attracting funding. This includes crowdfunding and contests, as well as new venture capital initiatives focused on the developing world.

Crowdfunding is the collective effort of individuals who network and pool their money, usually via the internet, to support an entrepreneur’s business. Crowdfunding platforms have become a popular way for entrepreneurs to get funding without giving up equity, and it is expected that start-ups will continue to

¹³⁷ World Bank, *Information and Communications for Development 2012: Maximizing Mobile*, 77.

¹³⁸ Mobile Monday, www.mobilemonday.net.

¹³⁹ A pitch fest is an event where entrepreneurs have the opportunity to pitch their ideas to potential investors.

¹⁴⁰ BarCamp is an international network of technology-related conferences where participants set the agendas.

¹⁴¹ Nicola Jenvey, “SA delegation praises DEMO Africa innovation competition in Kenya,” *Young Business Leaders*, November 16, 2012, <http://ybl.co.za/demo-africa-south-africa-contestants/>.

turn to crowdfunding as one of their primary sources of investment capital. According to [Forbes](#), crowdfunding will generate USD 500 billion in transactions in 2013.¹⁴²

Venture Capital for Africa is an example of a crowdfunding model to connect entrepreneurs building promising companies in Africa with investors from some 159 countries around the world. The community currently supports more than 400 ventures in over 30 African countries. Entrepreneurs have been featured in mainstream media, established joint ventures and secured funding. Entrepreneurs can publish business ideas, build a fan base, source feedback and meet experts. They can also receive dedicated mentorship support and open a round of funding. Investors, registered as part of the investor network, can access screened ventures and review ventures that match their investment criteria. Members meet online as well as organize offline-networking events called VC4Africa Meetups. These have been hosted in 35 cities around the world.

Website: www.vc4africa.biz

Contests are another popular way to compete for funding. Every year witnesses more and more contests – national, regional and global – where young entrepreneurs vie for prizes. In addition to winning start-up funds for their business ideas, young people gain invaluable experience pitching their ideas to judges, exchanging ideas with other young entrepreneurs, and networking with potential investors and business advisors.

The ITU Young Innovators Competition is held annually as part of ITU Telecom World. The 2012 event in Dubai offered nearly 400 entrepreneurs aged 18-25 from 77 countries the opportunity to showcase their ICT-based projects. The young entrepreneurs had intensive one-on-one sessions with industry mentors, including ongoing support over a one-year development period. They attended training sessions focused on developing entrepreneurial skills, as well opportunities to network with ICT representatives in industry, governments, and academia. Bangkok hosts the 2013 event on November 19-22.

Website: world2013.itu.int/event/innovation

Venture funds are also being established by many organizations to fund startups. These funds are typically found in specific countries or regions, and often combine funding with other forms of support such as business advice and mentorships.

Oasis 500 is an early stage and seed investment company, serving Jordan and the Arab States. It aims to support entrepreneurs by providing them with investment, training and mentorship in an effort to accelerate the transformation of their business ideas and start-ups into high growth companies in the ICT, digital media and mobile sectors. Entrepreneurs from Jordan or the Arab region can submit a start-up plan for USD 15 000 in seed capital. The funded start-ups are required to go through an intensive five-week boot camp in how to build a company, and are given office space for three to six months. For those who manage to grow after their first stage of incubation, there is more angel funding, legal advice, mentoring and networking opportunities with local business leaders, and possibly investment directly from Oasis500. Since 2010, it has received 2 000 applications and has invested in 49 companies.

Website: www.oasis500.com

¹⁴² Devin Thorpe, "Why Crowdfunding Will Explode In 2013," *Forbes*, October 15, 2012, www.forbes.com/sites/devinthorpe/2012/10/15/get-ready-here-it-comes-crowdfunding-will-explode-in-2013/.

6.4 Toolkits and training programmes

There are many digital resources designed to help young entrepreneurs that have been created by the major software companies, many in conjunction with development agencies. Some of these resources are available entirely online, while others combine online resources with in-person activities. Some examples include: the Small Business Toolkit,¹⁴³ a product of IBM and the World Bank's International Finance Corporation, Hewlett Packard's Smart Technology for a Smarter Business Program,¹⁴⁴ Intel Learn,¹⁴⁵ and Build Your Business, a collaboration between the International Youth Foundation and Microsoft.

***Build Your Business (BYB)** is an interactive entrepreneurship training course designed to introduce young people aged 16-35 to the basic ideas, actions, and skills needed to successfully launch, lead, and grow a micro or small business. It engages learners by using games, exercises, video clips, and case studies to explain and break down complex business skills – from learning how to research the market to developing an effective sales pitch and obtaining start-up capital. BYB uses a blended learning strategy in which skills introduced on e-learning modules are reinforced and enriched with face-to-face instruction led by a classroom facilitator and hands-on activities conducted by the learners in their communities.*

Website: www.iyfnet.org/build-your-business

6.5 Mobile resources

An increasing number of mobile phone resources are enabling entrepreneurs to access capital, process transactions, refine product design, research market information, find new suppliers, broaden their customer base, manage their supply chain, and streamline their business operations. With the number of mobile phone devices far eclipsing personal computers in most of the world “for many entrepreneurs in developing countries and rural areas, a mobile device is a tool not only for contacting customers and accessing the internet, but also for making financial transactions, establishing a client database, or coordinating just-in-time supply-chain deliveries. Such critical business functions can enable small firms to thrive in locations where accessing markets or selling new products would otherwise be impossible.”¹⁴⁶

Mobile payment systems and market information are two areas with plentiful mobile resources. Mobile payment systems have become a popular way for small businesses to handle their financial transactions outside the banking system and reduce the cost of financial transactions. When people can transfer funds quickly and securely, it becomes easier for small businesses to sell their products. This improves the efficiency of the marketplace and removes barriers to growth. In Kenya, the network provider Safaricom has pioneered a successful mobile payment initiative known as M-PESA. Currently the most developed mobile payment system in the developing world, M-PESA allows users with a national ID card or passport to deposit, withdraw, and transfer money easily with a mobile device. It has 12 million people who rely on it using the company's 20 000 distribution sites. Users can deposit money, make withdrawals, or transfer funds across accounts. Other mobile payment processors that work with mobile devices, such as Square¹⁴⁷, are also making business transactions easier for young entrepreneurs.

¹⁴³ Small Business Toolkit, www.smetoolkit.org.

¹⁴⁴ Hewlett Packard's Smart Technology for a Smarter Business Program, Smarttechforsmartbusiness.com.

¹⁴⁵ Intel Learn Program, www.intel.com/content/www/us/en/education/k12/intel-learn.html.

¹⁴⁶ World Bank, *Information and Communications for Development 2012: Maximizing Mobile*, 75.

¹⁴⁷ <https://squareup.com/>

Providing access to market information has long been a goal of many initiatives, especially targeting small business owners. While it has required more years than anticipated to realize meaningful results, today many services are helping small businesses, farmers, and others buy and sell over the internet, bringing with it more efficient markets.

***8villages** is a mobile platform that links Indonesian farmers to their communities of peers and their external business partners. The service provides farmers with market information such as crop pricing, crop yields, and catalogues of the national planting and harvest season. This is done through “crop groups.” The service has transformed their delivery format from pure SMS to SMS plus voice and content, which translates market intelligence information to better suit farmers’ needs. Marketing intelligence and campaigns are organized for agribusinesses that want to reach out to farmers and seed sellers or harvest buyers who also want to reach out to these communities. There are currently over 1000 farmers in West Java, Indonesia actively participating in the “crop groups” community.*

Website: www.8villages.com/

6.6 Comprehensive programmes

Many organizations and initiatives provide a suite of services, including entrepreneurship skills, ICT training, apprenticeships, business training, funding and/or mentorship, among others. These comprehensive programmes offer integrated services for young entrepreneurs with the aim of facilitating as much as possible the arduous process of starting a new business. Many of these programmes are the result of public-private partnerships.

***Microsoft YouthSpark** is a global initiative that aims to create opportunities for 300 million youth in more than 100 countries during the next three years. This companywide initiative includes programmes that empower youth to imagine and realize their full potential by connecting them with greater opportunities for education, employment and entrepreneurship. Through YouthSpark, Microsoft will dedicate the majority of its cash contributions to nonprofit organizations that serve the youth population around the world. In addition, Microsoft YouthSpark will include Office 365 for education, free technology tools for all teachers and students, and Skype in the classroom, a free global community for teachers to connect their students with others around the world.*

Website: www.microsoft.com/about/corporatecitizenship/en-us/youthspark/youthsparkhub/

7 Getting there – becoming ICT-savvy

Young people have an innate appetite for learning - be it, alone, in the school system, or with peers. Their curious minds harbour an immense, untapped potential for innovation capable of defying the most limiting situations. Today, young people learn differently thanks to the adoption and widespread use of increasingly sophisticated technologies and applications that are available on smart phones, tablets and personal computers.

A study looking at learning spaces and the influence of ICTs identifies six trends as the hallmark of the learning experience of and with ICTs.¹⁴⁸

- a. Classrooms are not the only form of learning space.
- b. Social interaction is a growing part of learning. Team and collaborative learning is encouraged.
- c. Technology is natural in the lives of the student – as the “digital native” – while the teacher – as the “digital immigrant” – may perceive technologies as a new part of the educational landscape.
- d. Internet resources can bypass peer review, changing the traditional publication and distribution processes.
- e. Learning can occur out of sequence as a result of intentional and serendipitous interactions on and offline.
- f. Students construct content rather than just consuming it. Students are active authors of content and innovation.

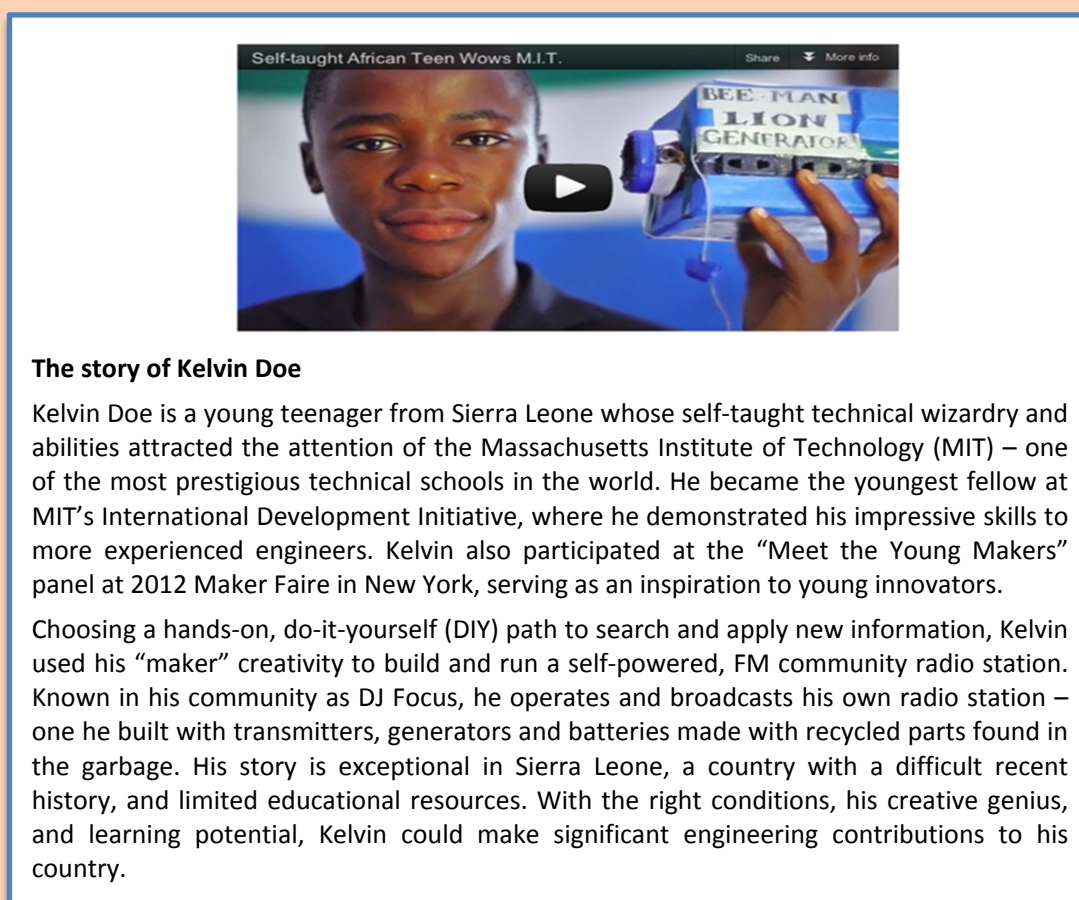
These trends reflect changes in the larger phenomena in society and are the subject of this chapter, which looks at *how* people acquire ICT skills and how those ICT skills are used to learn new ones and expand the scope of knowledge. More specifically, this chapter focuses on how youth can acquire the necessary skills to meet the challenges and changes imposed by a shifting society—where information and knowledge are key commodities.

The chapter presents evidence from a range of programmes and activities aimed at exploring new opportunities for learning that capitalize on the characteristics of the knowledge society and provide youth with spaces for engagement and creativity. The examples included in this chapter were chosen to show innovation and a variety of models, methods and channels for learning and teaching. Most of the programmes and activities target youth, but they also are open to the general population.

The chapter is divided into five sections; the first explores new learning models; the second looks at partnerships for promoting jobs and learning; the third examines the role of physical places for learning; the fourth explores the range of online resources that have proliferated; and the last section presents new accreditation models that are expanding ways to recognize skills.

¹⁴⁸ Andrew J Milne, "Chapter 11: Designing Blended Learning Space Student Experience," in *Learning Spaces*. eds. Diana G Oblinge (EDUCAUSE, 2006).

Figure 15: Story of Kelvin Doe



The story of Kelvin Doe

Kelvin Doe is a young teenager from Sierra Leone whose self-taught technical wizardry and abilities attracted the attention of the Massachusetts Institute of Technology (MIT) – one of the most prestigious technical schools in the world. He became the youngest fellow at MIT’s International Development Initiative, where he demonstrated his impressive skills to more experienced engineers. Kelvin also participated at the “Meet the Young Makers” panel at 2012 Maker Faire in New York, serving as an inspiration to young innovators.

Choosing a hands-on, do-it-yourself (DIY) path to search and apply new information, Kelvin used his “maker” creativity to build and run a self-powered, FM community radio station. Known in his community as DJ Focus, he operates and broadcasts his own radio station – one he built with transmitters, generators and batteries made with recycled parts found in the garbage. His story is exceptional in Sierra Leone, a country with a difficult recent history, and limited educational resources. With the right conditions, his creative genius, and learning potential, Kelvin could make significant engineering contributions to his country.

Source: Authors

7.1 New learning models

New technologies are changing how learning and teaching is done, creating new opportunities and challenges for teachers and learners alike. Teachers can take on the role of expert-facilitators of learning, while students can own the learning process and acquire knowledge at their own pace. New ways of interacting in the learning environment are also emerging. Three key trends are explored below: blended learning, self-directed learning, and collaborative learning.

7.1.1 Blended learning

Blended learning is the pedagogical integration of digital and face-to-face instruction. Blended learning encompasses flipped-classroom, mix-mode, hybrid, technology-mediated instruction, and web-enhanced instruction. In flipped classrooms,¹⁴⁹ for instance, technologies are intricately integrated in the teaching process. The use of new technologies in learning is more than a mere substitution of the medium of instruction; it is an intentional design that takes advantage of digital tools and technology to enhance learning.

¹⁴⁹ Flipped classroom is a blended learning model that where the teacher leverages technology to instruct, while reserving the classroom time to interact with students. Video lectures and other class-related information are delivered via the internet.

Figure 16: Blended learning and ICTs



Source: Authors

The blended learning process relies on digital environments called Learning Management Systems (LMS). LMS enable the creation of a virtual classroom for the students, complete with lessons plans, discussion fora, grades, quizzes, tests, class calendar and other resources. By having access to the class material, students can learn the concepts at their own pace and use the face-to-face time with the instructor to deepen their knowledge or to explore other issues of interest.

The virtual classroom on LMS is also a space for community building and interaction. Many LMSs integrate web 2.0 tools and applications such as prezi (prezi.com), slideshare (slideshare.net), youtube (youtube.com), facebook (facebook.com), evernote (evernote.com), and dropbox (dropbox.com), to name a few – which are readily available through tablets, mobile phones, and personal computers. Blended learning requires active participation and engagement from the students, thereby changing the experience of knowledge acquisition. It is no longer a mere transfer of information, where the student only consumes. The innovative aspect of blended learning rests on the new way it encourages students to learn about the technology while discovering other subjects. Students have the option to present their work using the technology—for example, instead of writing a paper or report, they can make a video, wiki, or podcast. There are some exciting examples of universities organizing contests with PhD students who present their scientific work using video or other technology.¹⁵⁰

¹⁵⁰ See the creative products that came as a result of the Contest “Dance your Ph.D.” organized by University of Sidney in Australia. <http://sydney.edu.au/news/science/397.html?newsstoryid=10307>. Similar stories emerged earlier in Canada: <http://vimeo.com/14528924>.

Blended learning has gained popularity mostly in European and North American high schools, colleges and universities, especially those equipped with broadband access. The implementation of blended learning is growing slowly in the developing world, where connectivity and infrastructure continue to present challenges. Nonetheless, a number of universities from the South have enhanced their distance education programmes by turning them into blended learning opportunities to reach migrant populations living abroad, mostly in Europe and the United States. These universities operate through satellite offices around the world, and attract working mothers as well as young and older professionals who take advantage of these offerings to complete their academic studies with lower costs, often studying in their native language.

*The **African Virtual University** is a Pan African Intergovernmental Organization created with the mandate to increase access to quality higher education and training through the innovative use of information communication technologies. AVU has the largest eLearning network, and it currently works in 27 countries, through 53 partner institutions, reaching Anglophone, Francophone and Lusophone African students. The AVU has its headquarters in Nairobi, Kenya and a Regional office in Dakar Senegal.*

Website: www.avu.org

One appeal of the blended model for youth and life-long learners is the flexibility it offers to combine work and study. It is expected that more and more universities and institutions will be using the blended learning model around the world.

7.1.2 Self-directed learning

With ICTs and the vast amount of free content available on the internet, the student (young and old) can choose what and when to learn. The student is no longer bound by curricular programmes, and can learn in a formal or non-formal manner. There is a transformative element to self-directed learning as Kelvin's case illustrates above. Self-directed learning is an option for youth who "find themselves trapped in the vicious circle of low skills, low productivity and low income."¹⁵¹ The opportunities to learn in a self-directed fashion are enormous.

Figure 17: Self-directed learning



Source: Authors

¹⁵¹ International Labour Office, *Apprenticeship in the Informal Economy in Africa*, (Geneva: ILO, 2008).

Prominent and emerging models of self-directed learning include open universities, open course ware (OCW), open educational resources (OER), and massive open online courses (MOOCs). They have in common the desire to democratize high-calibre educational materials across the world, empower learners of any age to take learning into their own hands by providing them with good educational options, and foster connections without boundaries.

Experts think that MOOCs, OERs, and OCW constitute a disruptive technology in education. MOOCs are becoming vehicles for unrestricted and unfiltered knowledge acquisition. One purveyor, Coursera, found that 68 per cent of its users are “from outside the United States, with India, China, Brazil, and Mexico all in the top 10.”¹⁵² At the same time, researchers have observed that very few people complete courses and have uncovered other evidence suggesting that the reality is currently falling short of the promise.¹⁵³ Like many innovations in their infant stage, it is still too soon to predict the future of MOOCs. There may be unanticipated effects, for instance, if relying on MOOCs results in not building “local capacity for education, research or knowledge creation in the education sector.”¹⁵⁴ Or, countries may figure out how to incorporate MOOCs into their societies in ways that strengthen, not detract from, building their education capacities. What can be assumed is that this type of learning will expand exponentially. This movement marks a transition to a learning paradigm in which knowledge acquisition is no longer only in the hands of policy-makers, publishing houses or instructors. Youth feel more empowered to decide on the type of education and the type of knowledge they want to acquire.

*Coursera is a for-profit social enterprise that facilitates large-scale participation of students who sign up for free online courses with top universities around the world. Coursera launched in April 2012, and it has since partnered with a number of universities interested in capitalizing on reaching a larger number of students. Professors affiliated with universities lead courses offered through Coursera, and students have the option of taking them for credit or just to learn something new. There is a high level of interactivity between students and professors. Also, student can organize face-to-face meetings using the Meetup app. Coursera is growing rapidly. As of September 2013 Coursera has had 17 million enrolments from students in 190 countries.*¹⁵⁵

Website: www.coursera.org/

¹⁵² Anya Kemenetz, “Online courses are taking off: But there’s a major downside,” (Slate.com, November 2013) www.slate.com/articles/technology/future_tense/2013/11/developing_countries_and_moocs_online_education_could_hurt_national_systems.html

¹⁵³ Tamar Lewin, “After setbacks, online courses are rethought,” (New York Times, December 10, 2013), www.nytimes.com/2013/12/11/us/after-setbacks-online-courses-are-rethought.html?emc=eta1

¹⁵⁴ Anya Kemenetz, “Online courses are taking off: But there’s a major downside,” (Slate.com, November 2013) www.slate.com/articles/technology/future_tense/2013/11/developing_countries_and_moocs_online_education_could_hurt_national_systems.html

¹⁵⁵ Coursera, www.coursera.org/about/community.

Similar services continue to grow as universities and other educational institutions seize the power of ICTs and adopt connectivist pedagogy principles¹⁵⁶ to deploy free and open access to instructional material on the internet. Other examples of initiatives assisting self-directed learning include: Moodle¹⁵⁷, Udacity¹⁵⁸, EdX¹⁵⁹, Second Life¹⁶⁰, among others.

7.1.3 Collaborative learning

There are vast opportunities for youth to engage in collaborative (or peer) learning using ICTs. Collaborative learning allows peers to share their knowledge, explore new areas of interest, and benefit from the cumulative knowledge of the group. Collaborative learning relies on positive interdependence with the group, individual accountability for learning and teaching, and clear processes to lead, follow and resolve issues related to project goals or group dynamics. Collaborative learning takes place both in-person and online, with ICTs expanding the range of possibilities.

There is evidence that working collaboratively increases productivity, and improves learning outcomes. As a model, collaborative learning undergirds many significant ICT initiatives such as the open source model. In the education sector, students enrolled in MOOCs are found to collaborate through social media and Meetups¹⁶¹ from their own locales across the world. ICTs and social media have brought down the barriers to collaboration and openness.¹⁶² With these barriers removed, the possibilities for collaborative learning are open to anyone. Those who participate enrich their knowledge by being exposed to a multitude of viewpoints and experiences of people with whom they otherwise would have been unlikely to connect.¹⁶³

¹⁵⁶ Connectivism is a network-based pedagogy. It informs the work of MOOCs, OCW and other open access pedagogical exercises. MOOCs for instances have drawn on such connectivist pedagogical principles as: aggregation – bringing a massive amount of content produced in different places online into one portal; remixing – associating materials from different sources together to create new ones; re-purposing – aggregated and remixed materials to suit the goals of courses, and; feeding forward – sharing of re-purposed ideas and content with rest of the world.

¹⁵⁷ Moodle, <https://moodle.org/>.

¹⁵⁸ Udacity, <https://www.udacity.com/us>.

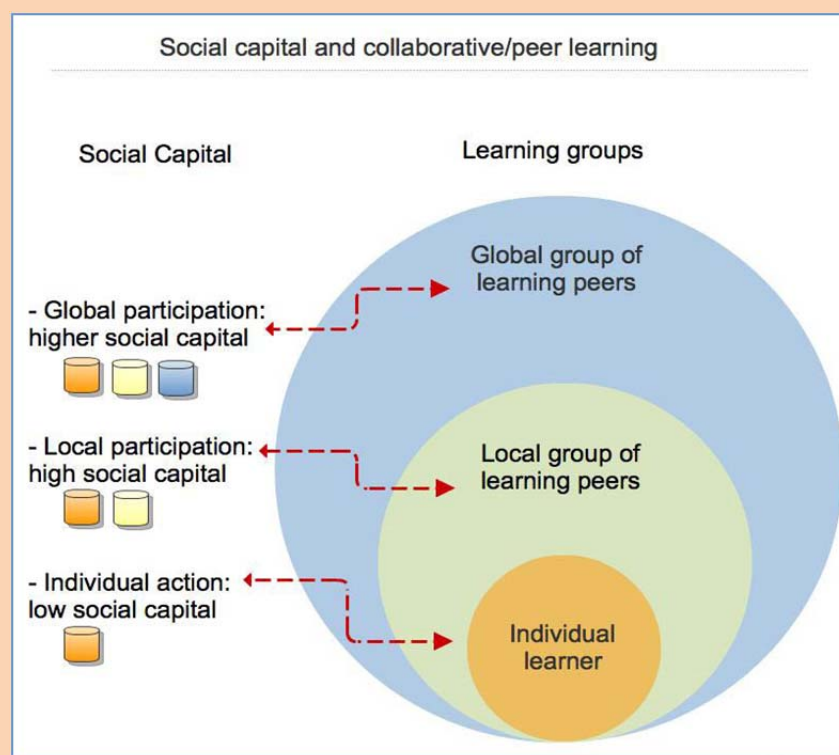
¹⁵⁹ EdX, www.edx.org/.

¹⁶⁰ Second Life Directory, http://wiki.secondlife.com/wiki/Second_Life_Education_Directory.

¹⁶¹ Meetups are intentional gatherings of people who share similar interests. They are organized using the Meetup platform. See more at www.meetup.com/.

¹⁶² Clay Shirky, "The Political Power of Social Media," *Foreign Affairs* 90, no. 1 (2011): 28–41.

¹⁶³ Nilofer Merchant, "Let Your Ideas Go," (*Harvard Business Review*, *Blogs.Hbr.org*, June 26, 2012), http://blogs.hbr.org/cs/2012/06/let_your_ideas_go.html.

Figure 18: Social capital and collaborative/peer learning

Source: Authors

In the context of youth employment, it is important to consider the benefits that participating in collaborative learning can offer. Collaborative learning events are opportunities for young people to learn ICTs (basic and advanced) as well as entrepreneurial skills. It can also result in increased connections and contacts with peers and experts in the field of interest; thus collaborative learning offers networking opportunities that may lead to participants learning about jobs as well. The sustainability and success of collaborative learning depends largely on the motivation and commitment of individuals who organize and participate in these events.

Peer 2 Peer University is an online space for learning guided by values of openness, community and peer learning. It offers courses (MOOCs) and an open master programme for anyone who wishes to learn. The courses are free and while the P2PU does not confer credits, it recognizes achievement through the Open Badges initiative, described later in this chapter. Badges are granted based on how students work together to learn a particular topic. P2PU houses the following communities: mathematical future, school of education, school of open, schools of webcraft, and school of innovation.

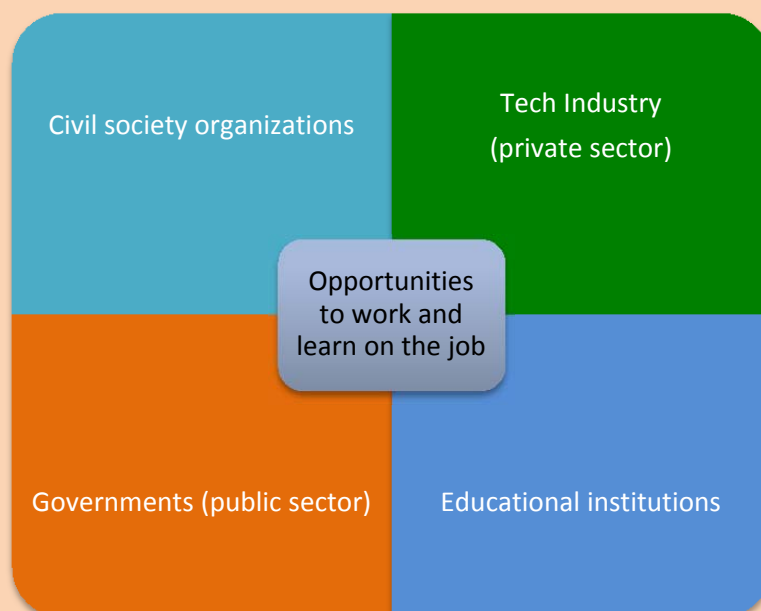
Website: info.p2pu.org

7.2 Partnerships for learning and jobs

As noted in chapters 3 and 4, a growing number of jobs require ICT skills of different levels. Research shows that the best way to perfect or develop skills is to have the opportunity to put them to use, preferably in a job situation. A number of initiatives have been created to help employees get the required ICTs skills on the job. These initiatives are designed to prepare youth for a better and more productive work experience. The initiatives – driven by private sector, civil society and international agencies – offer training opportunities, internships, apprentice programmes, and mentoring. Several reports point to the importance of mentoring in learning and skill development, finding that when youth

work alongside more experienced workers they acquire and develop many of the same ICT and soft skills and capacities of their mentors and co-workers.¹⁶⁴ This also explains the growing popularity of co-working spaces and technology hubs, a subject covered in Chapter 7.

Figure 19: Partnerships for learning and work



Source: ITU

Google Summer of Code, launched in 2005, is a global programme that has granted over 6 000 stipends to post-secondary developers for writing code for open source software projects. This event is held annually in various parts of the world. Students are paired with a mentor/s and given exposure to real-world software development scenarios and the opportunity for employment.

Website: code.google.com/soc

7.3 Learning and innovation places

The classic notion of the learning place is associated with organized institutions such as schools, universities, and vocational training centres. With the advance of new learning models described above, youth are taking learning to places like technology hubs, co-working spaces, and hacker/maker spaces. The popularity of these places demonstrates the lasting value of face-to-face interaction, which when coupled with interactive online tools, allows these places to offer a rich environment for learning, collaboration and co-creation.

¹⁶⁴ See reports by the European Youth Forum (2008); International Youth Foundation (2012), National Youth Agency – UK (2008), ITU (2012).

A report prepared for the European Commission in 2008 predicted some of these changes by arguing that the emergence and wide adoption of web 2.0 technologies would give rise to social networking, collaborative content creation and democratized innovation.¹⁶⁵ The technological changes seen in the intervening years have already gone farther than predicted in that report, especially in terms of the widespread impact of social networking and new locales for learning.

7.3.1 Co-working spaces and technology hubs

There are a growing number of co-working spaces and technology hubs that are supporting entrepreneurs and start-ups with training, networking, mentoring, and finding funding. A co-working space is a shared work environment where members have access to facilities such as a desk, meeting space, office equipment, kitchen and other amenities. Beyond the physical infrastructure, co-working spaces host events, offer trainings, and hold social gatherings. A technology hub is a form of co-working space with a greater focus on technology-based innovation. As such, they may offer programmes such as incubation services, hackathons, pitch fests, job boards, and contests that cater directly to the technology community. Tech hubs typically have strong ties with both global and local technology companies as well. In all of these places, it's the community of people that make them thrive. People join for the opportunity to meet like-minded people, share ideas, and learn from other members.

The iHUB is a co-working space and business incubator in Nairobi that was started in March, 2010 by Erik Hersman, Co-Founder of Ushahidi. The iHUB plays an extremely important role in Nairobi's tech community by bringing together entrepreneurs, hackers, designers and investors. The iHub provides a space where young entrepreneurial members can receive mentorship, internet connectivity and the possibility of venture funding through connections with the international venture capital community. The space is a tech community facility with a focus on young entrepreneurs, web and mobile phone programmers, designers and researchers. The iHub is part open community workspace (co-working), part nexus for investors and venture capitalists, and part incubator. Since it was founded, the iHUB has generated over 30 start-up companies, held over 120 events, launched a number of initiatives from research to a tech incubator, engaged with the university community, and created partnerships with numerous high-tech companies.¹⁶⁶ Most importantly, the iHub has created an ecosystem that connects people and fosters entrepreneurship.

Website: www.ihub.co.ke

7.3.2 Hacker/maker spaces

Another type of space is the hackerspace, or makerspace. Hacker/maker spaces have an emphasis on electronics and building physical objects. A core piece of equipment is the 3D printer, allowing one to make three-dimensional solid objects of virtually any shape from a digital model. Laser cutters, vinyl cutters, CNC (computer numerical control) routers and CNC milling machines are often part of the equipment mix as well. Most of these spaces offer classes in how to use the equipment and work with various mediums (wood, metal, fabric) in addition to electronic circuitry. Many innovations have come from hacker/maker spaces, including in areas often targeted by international development efforts.

¹⁶⁵ Riel Miller, Hanne Shapiro, and Knud Erik Hilding-Hamann, "School's Over: Learning Spaces in Europe in 2020: an Imagining Exercise on the Future of Learning," *JRC Scientific and Technical Reports* (2008), doi:10.2791/54506.

¹⁶⁶ Eric Hersman, "3.5 years later, what has the iHub done," *WhiteAfrican*, Last modified October 15, 2013, <http://whiteafrican.com/2013/10/15/3-5-years-later-what-the-ihub-has-done/>.

7.4 Repositories, games and mobile resources

Using online channels to learn and socialize is natural for young people. While this is not true for everyone around the world given disparities in access, it is important to note that young people easily gravitate to the online world given the right conditions. Some of the initiatives presented below provide content online that allows users to learn and demonstrate their skills. Online channels have broken the barriers to mass distribution, thus becoming a fertile ground for innovation and creation.¹⁶⁷ Ranging from video games to repositories to open courseware to social media, the internet offers multiple possibilities to acquire information and share knowledge.

7.4.1 Online repositories

With the ongoing explosion of content and choices, there is the need to organize and present it in ways that facilitate use and enhances searchability. These repositories are the creation of individual organizations as well as broader initiatives, representing both public and private sectors. Some are driven by mandates of accountability; others are guided by a commitment to transparency. For the purpose of this report, it is important to focus on what has resulted from such efforts: an increased access to information across many subjects including but not restricted to ICTs. This includes free books and open access peer reviewed journal articles.

***OpenLibra** is a repository that offers technical books under free licence in Spanish. An initiative of Etnasoft, Open Libra was created to offer Spanish-speaking developers access to technical knowledge in their language. Over a thousand users visit the site daily to access hundreds of titles in the repository free to download and distribute.*

Website: www.etnasoft.com

7.4.2 Games

It is estimated that young people spend an average of two hours a day playing video and/or online games. Some view this as a frivolous use of technology and time. However, playing has also been shown to be an effective way for people to be introduced to technology and acquire new skills. Learning with games is not an entirely new phenomenon; role-playing has been used for many years in education to impart new knowledge and socialize children. As game content became digitalized, playing video games moved online. This move has resulted in an explosion of creativity, including for learning. Games attract massive audiences with a diversity of backgrounds and gives rise to multiple opportunities for expanding the scope and uses of game playing.

***MinecraftEdu** is an initiative that combines games and learning for use in the classroom or other setting. The game accommodates multiplayer activities and offers tools to incorporate it into curricular content on a variety of subjects. There are fees associated with using the games in classrooms.*

Website: www.minecraftedu.com/

¹⁶⁷ Manuel Castells and Gustavo Cardoso, *The Network Society*, (Washington, DC: Johns Hopkins Center for Transatlantic Relations, 2006).

7.4.3 Social media

Social Media are used extensively for learning as well. Some of the major sites (e.g. Facebook and Twitter) became known as platforms for the exchange of personal stories and leisure activities, but more and more people are using these for educational and professional purposes as well. Social networks, blogs, podcasts, video sharing (YouTube, Vimeo), photo sharing (Flickr, Picasa), social bookmarks (Evernote, del.icio.us), presentation sharing (Prezi, slideshare), discussion forums (Google groups), events (Meetup) and thousands of other platforms are being used by individuals and institutions of learning to enrich the learning experience. For example, people who enrol in MOOCs take advantage of both online social media tools and applications such as Meetup to organize face-to-face study sessions at a local coffeehouse, library, or someone's house. Education experts call this connectivism, where "knowledge isn't a set of isolated facts to be memorized. Instead, it's actually a large set—or really a network—of connections, and learning is nothing more or less than traversing them. In the same way that you become proficient in a piece of music by playing its notes in order in an expressive way—that is, traversing its connections—you become proficient in a subject by participating in it. You see and appreciate the connections inherent in the subject, even creating new connections based on your experience."¹⁶⁸

7.4.4 Mobile phones – learning on the go

There are over 5.2 billion mobile phone subscriptions in developing countries.¹⁶⁹ The ubiquity of mobiles has turned them into a learning tool that can bring people living in remote areas closer to education. Taking advantage of the enormous mobile phone usage there are a multitude of efforts aimed at the full spectrum of knowledge and skills needed for workforce development, including: basic education, literacy and numeracy; language learning; hard and soft skills, and; entrepreneurship training.¹⁷⁰ As described elsewhere in this report, private and public entities have stepped up to offer mobile learning programs in numerous languages across all continents. The Mobiles for Education Alliance, comprised of 18 members (including: British Council, ITU, the MasterCard Foundation, Organization of American States, USAID, World Vision, World Wide Web Foundation) is illustrative of the interest and dedication being directed to the potential of mobile phones to vastly expand learning opportunities, especially for those in developing countries.¹⁷¹

Mobile learning is still in its infancy, with ongoing research being undertaken to understand what works, the conditions that contribute to successful outcomes, and effective strategies for expanding impact. Some efforts are mobile-only, while others integrate mobiles into a broader educational experience following the blended learning, self-directed learning, and collaborative learning examples discussed earlier. And while there are many programs that can be accessed via basic or feature phones, it is the proliferation of data-enabled phones (smart phones) that offers the greatest opportunities for mobile learning. In all cases, mobile devices can help young students access information at their own pace, and in some cases minimize the costs and inconveniences of having to travel to urban centres.

¹⁶⁸ Paul McFedries, "I'm in the Mood for MOOCs," *Spectrum.lee.org*, December 4, 2012, <http://spectrum.ieee.org/at-work/education/im-in-the-mood-for-moocs>.

¹⁶⁹ ITU, *Measuring the Information Society 2013*, (Geneva: ITU, 2013), www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2013.aspx.

¹⁷⁰ Linda Raftree, "Landscape Review: Mobiles for Youth Workforce Development," *Mobiles for Education Alliance*, 2013, 21, www.meducationalliance.org/content/mobiles-youth-workforce-development-landscape-review.

¹⁷¹ Mobiles for Education Alliance, www.meducationalliance.org/.

There is an opportunity for public access points, such as telecentres, libraries, and cybercafés to combine the portability of smart phones with the broader functionality of personal computers. Research on teens in South Africa who have smart phones and who frequent public access points found that they value the benefits of the computers for educational uses, though they also reported a desire for these places to institute services that would leverage their mobiles as well.¹⁷²

7.5 Certification

The certification process is a verification of competencies or skills resulting from having taken courses, performed training activities or successfully completed a programme. Certificates cover all skill levels, from basic to professional, some focus on a particular technology or application, and they can be obtained online or through regular schools.

For employers, certificates remain an important mechanism to assess the credentials of potential job candidates. Companies require evidence that new employees possess the skills needed for tasks that they will perform in their jobs.

Many types of entities issue certificates. Educational institutions, from private institutes to public universities, are the traditional purveyor of diplomas and certificates. Employers assign great weight to such certificates when the credentialing entity is well known and recognized in the country for high quality education and rigorous testing.

Technology companies, including Microsoft, CISCO, HP, Samsung, Apple, and Google, also offer certificates. The self-directed learner can earn some of these certificates online directly. NGOs and private institutes also rely heavily on the curricula and certificates from these companies to offer face-to-face instruction. For example, one can take the Microsoft Digital Literacy curriculum from the Microsoft site¹⁷³ or enrol at one of the thousands of civil society organizations worldwide that offer this training.

Finally, there are regional and global initiatives to establish standards that span a range of skills and competences. The most prominent example is the European Computer Driver Licence.¹⁷⁴ Despite its name, there are accredited test centres in most countries in the world.

There are a number of certification programmes, many of which are funded by technology companies. Others are offered by civil society organizations and educational institutions. Global and regional initiatives also exist.

¹⁷² Marion Walton and Jonathan Donner, *Public Access, Private Mobile*, Global Impact Study Research Report Series, (Seattle: Technology & Social Change Group, University of Washington Information School, 2012), www.globalimpactstudy.org/wp-content/uploads/2012/11/Public-access-private-mobile-final.pdf.

¹⁷³ Microsoft Digital Literacy curriculum, www.microsoft.com/about/corporatecitizenship/citizenship/giving/programs/up/digitalliteracy/default.aspx.

¹⁷⁴ European Computer Driver Licence, www.ecdl.org.

*The **European Computer Driving Licence** is an international computer skills certification programme. Outside of Europe it is known as the International Computer Driving Licence. The certification programme operates in 41 languages, working through partnerships with national operators and test centres located in 148 countries. The programme consists of series of modules to build different levels of computer skills – from basic to advanced – that will prepare people for work or studies. Certification programmes are designed to be accessible to everyone, and there are fees associated with the certification.*

Website: www.ecdl.org

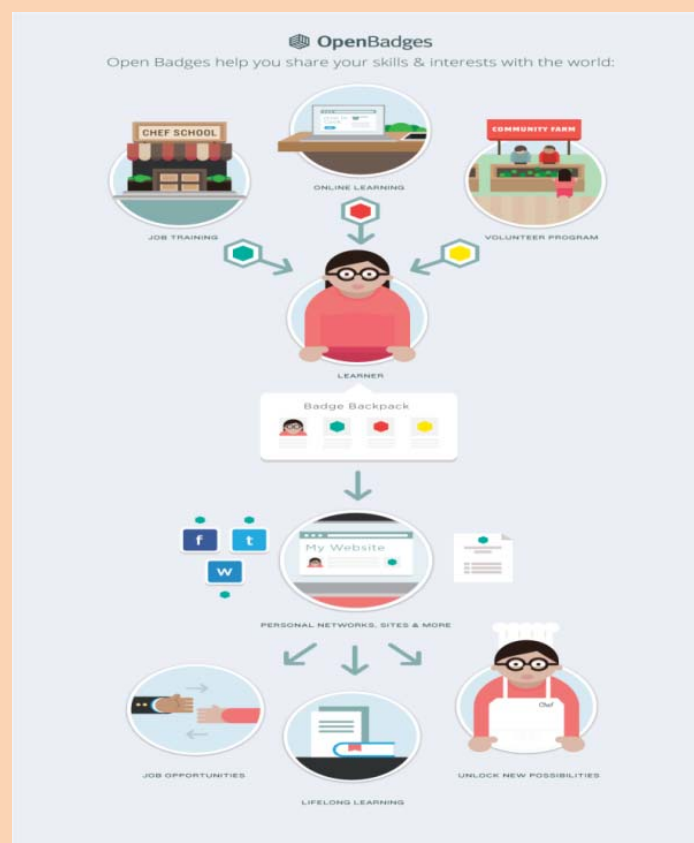
7.5.1 Badges

New thinking is entering the certification arena, with the one garnering significant recent attention is known as “Badges.” Badges have become an alternative form of accreditation, led by the Mozilla Foundation and its Mozilla Open Badges. Digital badges are similar in concept to the badges system of the Boy Scouts wherein one earns a badge when a particular skill is mastered.

Figure 20 shows how Mozilla Open Badges work. As depicted, the learner is at the centre of the system. The badge itself is an online representation of a skill that has been learned. “Badge issuers” – schools and universities, community and non-profit organizations, government agencies, and companies among others – establish the criteria and tests to verify mastery of subjects. Learners collect badges in a “backpack” where they can be displayed online for potential employers and others to view.

One distinctive feature of badges is that they contain information about assessment and other metadata that can be useful to employers to understand, for example, precisely what skills have been learned, a level of granularity that is unavailable in other forms of accreditation. The importance of badges rests on its premise that ICT skills need to be recognized regardless of the place where the learner has acquired them. For self-directed learners and others, badges offer a promising way to demonstrate, acquire and promote their skills.

Figure 20: How Open Badges work



Source: Mozilla Open Badges¹⁷⁵

8 The role of government

In a statement released for International Youth Day 2012, the UN Secretary-General, Ban Ki-Moon describes youth as a “transformative force,” who are “creative, resourceful and enthusiastic agents of change, be it in public squares or cyberspace.” However, “too many young people, including those who are highly educated, suffer from low-wage, dead-end work and record levels of unemployment.”¹⁷⁶ Youth unemployment and underemployment are at a record high. Tackling this enormous challenge requires the coordinated efforts of governments, the private sector, civil society, academia and international agencies.

The preceding chapters have highlighted a number of innovative initiatives from around the world designed to harness ICTs for youth education, employment, and entrepreneurship. The examples are the result of a combination of factors: deliberate, and in some cases unanticipated, multi-sectoral (governments, private sector, and civil society) investments; supportive policy environments, and; partnerships across sectors to spur innovation, economic growth and employment. International agencies have played a vital role by bringing attention to the urgent needs of youth, and convening governments and other stakeholders to set a global agenda and advocate for strategies to address the situation.

¹⁷⁵ Mozilla Open Badges, www.openbadges.org/about.

¹⁷⁶ Ban Ki-moon, “Secretary-General’s Message for 2012: International Youth Day,” *UN.org*, www.un.org/en/events/youthday/2012/sg.shtml.

This chapter looks at the role of governments in advancing policies, programmes and strategies for youth employment and entrepreneurship. It is especially concerned with the school to work transition, an important period in the lives of youth. The chapter focuses on five areas: (1) integrating ICTs into education, (2) supporting non-formal channels of learning, (3) supporting alternative accreditation systems, (4) advancing public-private partnerships, and (5) enacting policies that boost employment and entrepreneurship opportunities.

8.1 ICTs in education

The opportunities for learning and innovating with ICTs are immeasurable, as this report has shown. However, despite significant investments, formal educational systems continue to face challenges in preparing youth with the ICT-related skills they need to succeed. As a recent OECD report on the Outlook of Science, Technology and Industry points out, traditional models of education are not adequately preparing students to meet the demands of a changing job market.¹⁷⁷ The report emphasizes that formal education remains the primary vehicle for improving the supply of skills needed for driving innovation, and that governments need to take measures to address the limitations of their systems.

Many experts have linked the limitations of the educational systems to a lack of real integration of ICTs *in* education. The lack of integration negatively affects knowledge acquisition using ICTs, in general, and the acquisition of ICT skills, in particular, even when ICTs are available in the classroom. Many factors account for this situation, including: lack of software and technical support; absence of reliable electrical supply; inadequate student-computer ratios; ICT learning restricted to studying basic computer literacy and not for learning other subjects; and importantly, the limited capacity of teachers to make more integrated use of ICTs for teaching and learning.¹⁷⁸

There are many active regional initiatives. The Latin American Network of Educational Portals (RELPE)¹⁷⁹ gathers ministers of education from 23 countries (25 portals) in the region and Spain with the goal of making ICTs an integral part of education by training and providing resources to increase the ICT capabilities of teachers.

In Africa, SchoolNet Africa and the PanAfrican Research Agenda on the Pedagogical Integration on ICTs have developed a series of evidence-based policy documents to help educators, administrators, and policy-makers. Other initiatives provide educators and students with practical resources for use in the classroom.

In Asia, some countries have achieved a high degree of integration of ICTs in education while others are still working to provide digital access and basic literacy to large parts of their populations.¹⁸⁰ In regional surveys, countries such as Korea, Singapore, Japan, China, and Taiwan rank high for their achievements in ICT in education programmes and support of sciences and technical innovation.¹⁸¹ In the rest of the region a significant amount of work is still needed. Nonetheless, it should be noted that new national

¹⁷⁷ OECD, *OECD Science, Technology and Industry Outlook 2012* (OECD Publishing, 2012), 486, http://dx.doi.org/10.1787/sti_outlook-2012-en.

¹⁷⁸ Robert B. Kozma and Shafika Isaacs, *Transforming Education: the Power of ICT Policies*, (Paris: UNESCO, 2011), <http://unesdoc.unesco.org/images/0021/002118/211842e.pdf>.

¹⁷⁹ Red Latinoamericana de Portales Educativos (RELPE), www.relpe.org/.

¹⁸⁰ OECD, *OECD Science, Technology and Industry Outlook 2012*; infoDev, "Information and Communication Technology for Education in India and South Asia," (Infodev.org, June 4, 2010), www.infodev.org/en/Publication.876.html.

¹⁸¹ Larry Johnson et al., "The NMC Horizon Report: 2012 Higher Education Edition" (Austin: The New Media Consortium, 2012), www.nmc.org/publications/horizon-report-2012-higher-ed-edition.

programmes in Afghanistan, Bangladesh, Cambodia, India, Laos, Pakistan, and Viet Nam designed to support the integration of ICTs in education are starting to show results.¹⁸²

The importance of government coordination

Research reveals that many ICT and education efforts have been implemented as independent interventions by ministries, departments or agencies, limiting their impact.¹⁸³ Seizing the potential of ICTs for education requires an integrated, coordinated approach across relevant ministries.¹⁸⁴ A national strategy that guides the work of multiple ministries enhances complementarity of efforts and reduces redundancy. In some countries ministries of labour, telecommunications, youth or human development, education, social development and even industry work together to identify common areas of interest and develop targeted activities.¹⁸⁵

The following examples show the initiatives deployed in two countries, Uruguay and Estonia, illustrating two distinct approaches for developing an ICT-ready population. Not surprisingly, these two countries score high on the ICT Development Index.¹⁸⁶

Uruguay put in place the Plan Ceibal (Conectividad Educativa de Informática Básica para el Aprendizaje en Línea),¹⁸⁷ a comprehensive policy-driven national programme designed to “facilitate the construction of new learning environments and the generation of an adequate context for Uruguay’s children to be able to answer to the demands of the information and knowledge-based society.”¹⁸⁸ This programme aims to mainstream ICTs in the classroom, and has been developed in coordination with multiple government agencies.¹⁸⁹

In Estonia the government has taken a more radical approach by launching a national programme to teach students aged 7 to 19 to write code as part of its national digital strategy.¹⁹⁰ Working with industry leaders, this public-private partnership aims to plant the seeds of innovation as early as possible.¹⁹¹ The programme is made possible by DSL¹⁹² connections in every school in the country.

¹⁸² infoDev, “Information and Communication Technology for Education in India and South Asia,” OECD, *OECD Science, Technology and Industry Outlook 2012*: 486; and Kozma and Isaacs, *Transforming Education: the Power of ICT Policies*.

¹⁸³ Johnson, et al., “The NMC Horizon Report: 2012 Higher Education Edition.”

¹⁸⁴ Kozma and Isaacs, *Transforming Education: the Power of ICT Policies*; OECD, *OECD Science, Technology and Industry Outlook 2012*.

¹⁸⁵ Kozma and Isaacs, *Transforming Education: the Power of ICT Policies*; Nidhi Tandon et al., *A Bright Future in ICTs Opportunities for a New Generation of Women* (Geneva: ITU, 2012).

¹⁸⁶ ITU, *Measuring the Information Society 2012* (Geneva: ITU, 2012), www.itu.int/ITU-D/ict/publications/idi/.

¹⁸⁷ The Plan CEIBAL, *Conectividad Educativa de Informática Básica para el Aprendizaje en Línea / Educational Connectivity of Basic Informatics for Online Learning*. www.ceibal.edu.uy/.

¹⁸⁸ Kozma and Isaacs, *Transforming Education: the Power of ICT Policies*.

¹⁸⁹ The Plan CEIBAL, *Conectividad Educativa*.

¹⁹⁰ Innovation Centre for Digital Education, www.tiigrihype.ee/en.

¹⁹¹ Parmy Olson, “Why Estonia Has Started Teaching Its First-Graders to Code,” (Forbes.com, September 6, 2012), www.forbes.com/sites/parmyolson/2012/09/06/why-estonia-has-started-teaching-its-first-graders-to-code/.

¹⁹² Digital Subscriber Line (DSL).

8.2 ICT skill development in non-formal educational settings

The examples from Uruguay and Estonia fall within the formal education systems. Yet, as the earlier chapters show, the places where young people or lifelong learners can develop ICTs skills have transcended the walls of the classroom. Learning can happen anywhere, be this in hackathons, meetups, MOOCs, codefests, using freely available information online, or participating in contests. These are opportunities governments need to pay attention to and support as they have shown to be fertile sites for innovation and learning.

Promoting these kinds of activities requires openness to uncertainty and risk. To date, most activities have been supported and initiated by non-government entities and the private sector. In instances where government has taken note and supported such innovations, it has helped scale initiatives and ensure their sustainability. Following are some examples.

Singapore plans to introduce MOOCs in K-12 education to provide alternatives for learning and promote curricular openness. The aim is to advance an open ecosystem through a culture of content and knowledge sharing.¹⁹³ The benefits of such initiatives in elementary school remain to be evaluated. Nonetheless, it is encouraging to see governments taking interest. In the case of Singapore, it is clear that the government recognizes the potential for its goals as a country.

In Africa two efforts – the Open Medical Record System¹⁹⁴ Movement and Open Architecture Standards and Information Systems¹⁹⁵ – illustrate how governments there have seized the potential of open collaboration to create tools that help government deliver better health services. Representatives discussed and prioritized needs, and then launched hackathons (such as the Summer of Code with support from Google) to develop apps for these two systems. The impetus for these efforts started at the local level: young people from the open source movement, university researchers, the private sector, international donor agencies and national governments. The initiatives started with Mozambique, Rwanda, South Africa, and Zimbabwe, and have spread to Kenya, Malawi, Tanzania, Uganda, and even beyond African borders to Chile, India, Pakistan, and other countries.

There are many other instances of governments using hackathons, codefests or innovation spaces to engage young people in developing apps for local and national governments. This has resulted in applications for water resource management, transportation, disaster management and many other areas. Government procurement of the innovations that emerge from these initiatives is also very important. Some of these alliances have contributed to a change in attitude among government officials, industry leaders and ICT innovators.

8.3 Alternative accreditation and certification methods

A key factor in the success of alternative learning pathways is recognizing the skills and knowledge people acquire. This seems to represent a significant stumbling block for those who adhere to the notion that *only* traditional certification and accreditation systems are appropriate. Conventional accreditation and certification systems represent agreed upon standards, often sanctioned by authorities created to guide the work of education granting organizations and institutions. Such systems are of course important and need to be continuously updated to reflect changes in technology and workforce needs.

¹⁹³ Larry Johnson et al., *Technology Outlook for Singaporean K-12 Education 2012-2017*, (Austin, Texas: The New Media Consortium, 2012), www.cominit.com/ict-4-development/content/technology-outlook-singaporean-k-12-education-2012-2017.

¹⁹⁴ OpenMRS, <http://openmrs.org/>.

¹⁹⁵ Jembi Health Sysetms, www.jembi.org/programs/.

At the same time, it is important for governments to recognize the growth and influence of alternative methods and systems of certifying skills, such as badges. As shown in chapter 7, through the Open Badge Infrastructure, any organization or association can issue badges to certify the mastery of knowledge and skills. The concept is relatively new, but it is gaining momentum and within the next three years the badges system is expected to be widely adopted.¹⁹⁶ Accordingly, governments will need to develop stances that take into account badges and other alternative certification systems.

8.4 Public-private partnerships

One of the chief complaints from employers is that they cannot find qualified labour to fill the vacancies. This is matched by a similar complaint from young people who say that they cannot find jobs even when they are qualified.¹⁹⁷ This skills mismatch is a leading cause of the youth unemployment crisis.

Establishing channels for dialogue among industry leaders, policymakers, academia, and youth is an important role for government. Such dialogue allows all parties to gain a better understanding of job trends and requirements, which in turn contributes to the formulation of education and labour policies that responds to the needs of the market and spurs innovation. Models of such dialogues can be found in Singapore, Korea, Switzerland, Estonia, and Germany among others, where the national science and technology strategies and curriculum are formulated in dialogue with industry.¹⁹⁸ These policies and investments are designed to attract students into science, technology, engineering and mathematics (STEM) fields. Similar programmes are emerging in developing countries. In Rwanda for example, the government has launched the “National ICT Literacy and Awareness Campaign,” a joint initiative of the Ministry of Youth and ICT, Ministry of Local Government, the Ministry of Education, the Rwanda Education Board, Rwanda Development Board, and the Private Sector Federation.

An open dialogue between governments and the private sector can help overcome issues related to coordination of investments in skills development and education. Many businesses make public-private partnerships a priority and have dedicated budgets for apprenticeship, job placements, and other programmes. Civil society organizations can be involved as well.

In the United Kingdom, the National Apprenticeships Service has developed a three-way partnership with QA Apprenticeships and Cisco Apprenticeship to offer high school graduates three-year apprenticeship opportunities with CISCO.¹⁹⁹ In Jordan the Ministry of Social Development is responsible for a programme designed to provide marginalized youth with training and job opportunities in private sector institutions. Youth gain real work experience and on-the-job training through this programme.²⁰⁰ In Malaysia, the Penang Skills Development Centre,²⁰¹ created as a joint partnership among government, academia and industry, offers a range of training programmes for youth.

¹⁹⁶ Johnson, et al., “Technology Outlook for Singaporean K-12 Education 2012-2017.”

¹⁹⁷ International Youth Foundation, *Opportunity for Action: Preparing Youth for 21st Century Livelihoods*; ITU, Tandon et al., *A Bright Future in ICTs Opportunities for a New Generation of Women*; World Bank, *World Development Report 2013: Jobs*.

¹⁹⁸ OECD, *OECD Science, Technology and Industry Outlook 2012*.

¹⁹⁹ “Cisco,” QA Apprenticeships, <http://apprenticeships.qa.com/employers/corporate-bespoke-apprenticeships/qa-apprenticeships-at-cisco>.

²⁰⁰ International Youth Foundation, www.iyfn.org/news/1160.

²⁰¹ Tandon et al., *A Bright Future in ICTs Opportunities for a New Generation of Women*; see also Penang Skills Development Centre (PSDC), www.psd.org.my/.

Another area for government-private sector partnership is job placement. In the apprenticeship examples above, participants are remunerated for their work and also have the opportunity to study part-time. After completing the programme, participants are expected to find jobs on their own. Other programmes are limited to training, and businesses use them to identify talent. Often, when businesses offer apprenticeships, internships or any other form of on-the-job-training opportunity, they limit their commitment to the duration of the programme. While students in these programmes in general fare well, this type of initiative could be complemented with a job placement element. Whether the placement is with the companies involved in the partnership, or with the government, or with civil society, the government has a role to play in ensuring that well-trained young professionals find a job. The areas where ICT-savvy professionals can be absorbed are growing as shown in chapters 4 and 5 describing trends and opportunities in macro sectors as health, agriculture, and business process outsourcing, as well as in a vast array of emerging areas from microwork to green jobs to accessibility solutions for persons with disabilities.

8.5 Policies to support youth entrepreneurship

Entrepreneurship has become a policy priority in many countries. Whether driven by necessity or opportunity, entrepreneurs need support to succeed. This is especially true for young entrepreneurs who have less social and financial capital, smaller business networks, and less experience. Government programmes and policies can create favourable conditions to launch and sustain youth entrepreneurship initiatives. Examples of strategies that have proven effective include:

- Develop a culture of entrepreneurship by providing appropriate training that encompasses innovation, personal development, leadership and practical business skills. Ensure training opportunities can be accessed through formal and non-formal channels.
- Ensure access to business, legal and related information to help new entrepreneurs in the early stages of their business development.
- Simplify business registration processes.
- Provide financial incentives for new entrepreneurs, such as: access to low interest capital through loans or credit; seed funding; grants; reduced tariffs and taxes; reduced cost for licences and registrations, and; financial advice. Also provide access to microcredit without need for collateral. Financial assistance should be complemented with mentorship and other support programmes to reduce exposure to non-repayment risk.²⁰²
- Organize and offer mentorship opportunities for youth to learn from more experienced business people. For instance, chapter 7 mentioned workshops, conferences, and competitions that bring together investors, business people, and government representatives. Such activities help entrepreneurs to build networks, showcase their wares, find talent, identify business opportunities and seek financial investments.
- Promote and support collaborative innovation spaces, including co-working spaces, tech hubs, business incubators, and hacker/maker spaces. These spaces offer vibrant locales for apps development and other activities, stimulate creativity, and increase the likelihood that new entrepreneurs will stay in business following incubation periods.²⁰³

²⁰² Commonwealth, “Commonwealth Youth Credit Initiative.” Last modified February 20, 2012. www.thecommonwealth.org/Internal/152929/152933/152934/152935/commonwealth_youth_credit_initiative/.

²⁰³ OECD, *OECD Science, Technology and Industry Outlook 2012*.

- Foster innovation through contests and competitions. This can be accomplished by partnering with other actors such as donor agencies, corporate businesses, and NGOs, and can be organized at the national or regional level.
- Stimulate the production of local content and products and help create demand for them, for example text-to-speech engines in local languages.
- Broker inter-governmental partnerships for regional cooperation and exchange to encourage more South-South and North-South collaborations for learning and trade.
- Use government procurement to purchase products and services from entrepreneurs and small companies.

9 Conclusion

The transformations taking place around youth, ICTs, employment, and entrepreneurship are characterized by rapid change and innovation. Mainstream economic sectors from agriculture to healthcare are witnessing an explosion of new ICT-enabled applications, both raising the bar in terms of the minimum ICT skills needed to perform job tasks, and generating new opportunities for entrepreneurs developing ICT products and services for these sectors. Beyond these sectors, the internet itself is responsible for making possible new opportunities that have generated livelihoods for millions of people. Crowdsourcing, microwork, app development, and other emerging income generating activities owe their existence to global internet expansion that continues to connect more and more of the world's population.

Seizing these opportunities requires the right skills and knowledge. Which skills are needed for which jobs however is not straightforward. As the types of jobs and tasks requiring knowledge of ICTs has multiplied, the range of skills has similarly expanded and diversified into numerous skills subcategories. Whereas basic computer skills and knowledge of productivity applications may still qualify a person for routine office work, such skills are insufficient for many of the new opportunities described in this report. Depending on the area, these new opportunities require one or more of several other abilities in such areas as information seeking, communication, collaboration, content production, multimedia creation, web design, security and privacy, solving technical problems, and programming, among others. Becoming a successful entrepreneur requires business skills as well, such as operations and management, finance, marketing, communications, research, and technology management.

Soft skills such as critical thinking and problem solving, flexibility and adaptability, social and cross-cultural skills, and initiative and self-direction are also essential. Entrepreneurs, more than entry level jobs, will generally require more advanced soft skills, though over time any person's prospects for career advancement will hinge on mastery of these soft skills in addition to ICT skills.

Fortunately, the market has responded with a multitude of new opportunities for people to learn different types of skills, in different ways, using different technologies, accessing different resources, and leading to different types of certifications. Innovations in learning both ICT and soft skills are plentiful and increasing every month. Existing programmes are improving, and new entrants are continuously introducing new products and services. Advances in mobile learning are opening new doors. Moreover, many of the resources are available at little or no cost. Anyone with an internet connection can access open courseware, enrol in a MOOC course, or receive a badge certifying mastery of a subject.

Many programs feature face-to-face interactions. Tech hubs, co-working spaces, hackathons, apprenticeships, and networking events represent just a few of the ways people learn, and innovate, together. Indeed, some of the greatest opportunities may be realized by combining online and offline activities.

Youth are ideally suited to take advantage of these opportunities. In general they are naturally comfortable with technology and operating in online environments, adept at absorbing new concepts and skills, and capable of seeing new possibilities. Youth are the heaviest users of most digital technologies,

and have driven the explosive expansion of social media and other web 2.0 applications. It is these new applications that have underpinned many of the new job and entrepreneurial opportunities.

How can youth be better prepared and positioned to seize new employment and entrepreneurship opportunities? The report has outlined a number of strategies pertaining to the role of government. Government can lead efforts to incorporate a number of the learning programmes and pedagogical models, such as blended learning and flipped classrooms, into K-12 and higher education. It can also mobilize efforts with the private sector to recognize alternative certification models, such as badges, thereby opening up ways to recognize skills mastery outside of formal education. Government can also lead dialogues with industry, academia, nonprofit organizations, and youth to monitor and respond to ongoing changes in job trends. Public-private partnerships can further advance youth employment through training, internships, and job placement programmes. Policies and programmes to support entrepreneurship require another level of dedication. This ranges from creating favourable conditions for start-ups such as ease of business registration and access to low-interest loans, to direct support for such initiatives as innovation spaces and incubators to attract creative talent.

Community organizations also have an important role to play in equipping youth with the relevant skills and connecting them to employment and entrepreneurship opportunities. Telecentres, libraries, community technology centres and other places that offer computer resources, internet connectivity, and space for group activity are ideally positioned to implement programmes that will provide youth with the skills and experience they need to pursue these opportunities. They represent a non-formal channel for learning, and as such they tend to have more flexibility than formal schools to experiment and implement the types of programmes contained in this report. Moreover, many youth require an intermediary to motivate, guide, structure, and otherwise provide an environment that facilitates learning. While self-directed youth can take advantage of online programmes on their own, the majority of youth requires this extra assistance.

International organizations can raise awareness about these new trends, develop resources to address the needs of youth and support governments in implementing youth employment and entrepreneurship strategies, while development agencies and foundations can provide financial support and expertise.

All stakeholders in the ecosystem – international organizations, governments, development agencies, private industry, nonprofit organizations, and foundations – have important roles to play to realize greater opportunities for youth. Doing so requires that stakeholders embrace the innovative process: be open to experimentation, ensure robust feedback systems are in place to learn from successes and failures, be nimble to change direction as needed and incorporate new technological advances, not seek a one-size-fits-all model (it doesn't exist), and otherwise adopt the same innovative approach that we want to imbue in our youth.

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Glossary

Accelerators	For-profit incubator that support start-ups with funding and other services in exchange for equity.
Affordances of the web	Refers to properties of a web site's user interface that allows the easy discovery of possible actions.
Apps	Software application developed for a digital device. The term is often associated with the applications that run on mobile phones.
Badges	A certification system for recognizing skills and knowledge, led by the Mozilla Foundation.
BarCamp	An international network of technology-related conferences where participants set the agendas.
Business process outsourcing	Refers to the outsourcing of particular business operations, such as finance, human resources, and customer services.
Codefest	An event where technical people convene to write computer code.
Coding	Writing instructions for a computer program.
Connectivism	A network-based pedagogy that informs the work of MOOCs, OCW and other open access initiatives.
Crowdfunding	The collective effort of individuals who network and pool their money, usually via the internet, to support an entrepreneur's business.
Crowdsourcing	Outsourcing of tasks or larger projects to a distributed group of people.
Customer relationship management (CRM)	The management of an organization's interactions with its customers, typically involving technology.
Data depulication	A technique for eliminating duplicate copies of repeating data.
Digital native	A person born after the general introduction of digital technologies.
Enterprise resources management (ERM)	A business method that addresses an organization's relationships with all of its constituencies (customers, partners, suppliers, employees, etc.). ERM goes beyond customer relationship management (CRM).
Flipped classroom	An instructional model where students view video lectures and other online resources outside of class, with class time devoted to discussion and group work.
Geographic information system	A system for capturing, manipulating, analyzing, and displaying geographical data.
Gold Farming	Playing a multiplayer online game to acquire in-game currency that other players purchase in exchange for real-world money.
Hackable games	Games where players, who do not necessarily identify as developers or coders, can change aspects of the game and share their changes with other players.
Hackathon	Event where computer developers, graphic designers, and/or other experts come together to collaborate and produce software projects, apps, and other solutions.
Hacker/maker space	Community-operated workspace where people with common interests meet and collaborate around computers, technology, or digital art.

HTML	HyperText Markup Language (HTML) is the main markup language for creating web pages and other information that can be displayed in a web browser.
HTTP and HTTPS	The Hypertext Transfer Protocol (HTTP) is an application protocol that forms the foundation of the World Wide Web. Hypertext Transfer Protocol Secure (HTTPS) adds security capabilities to standard HTTP.
Human resource management (HRM)	The management process of an organization's human resources, encompassing employee recruitment, selection, assessment and other functions.
Impact sourcing	Socially responsible business process outsourcing (i.e. by employing people from disadvantaged groups).
Incubators	Programs that support start-ups through business support services and resources.
Information Technology Outsourcing (ITO)	Refers to the outsourcing of computer or internet related work, such as programming.
Knowledge process outsourcing (KPO)	Refers to the outsourcing of information-intensive activities such as market research, legal services, and patent applications.
Mashups	The combination of individual parts of digital music, video, or applications to create a new piece of work.
Massive open online courses (MOOCs)	Online courses featuring limitless participation and open access.
Meetup	Intentional gatherings of people who share similar interests, organized using the Meetup platform.
Microwork	Small digital tasks that can be completed in a few seconds by people without specialized skills.
Mobile learning	Learning via a mobile device or learning that happens when the learner is not at a fixed location.
Open educational resources (OER)	Freely available documents and media for educational purposes.
Open universities	Refers to a university that is open to all learners with no admissions requirements.
OpenCourseWare (OCW)	Courses offered by universities made available in digital format, at no cost, and free to adapt under an open licence. OCW does not include access to faculty or certifications
Pitch fests	Events where entrepreneurs have the opportunity to pitch their ideas to potential investors
Powerleveling	Using the help of another, stronger player in a role playing video game to level a character more quickly than is possible alone. A player may pay a company or individual to play and level-up their character.
Tagging	The assignment of keywords or terms to a piece of information.
Venture capital	Financial capital invested in start-up companies.
Web 2.0	Websites that allow users to interact, collaborate, and create content (in contrast to static websites).
Web literacy	Refers to not only being able to read the web but also having the ability to 'write' it (create pages, documents and multimedia assets).

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