



LKDF Forum 2021 - Background Paper

Digital skills and social inclusion: where are the most powerful links?

Stefania Bait, Mattias Larsen, September 2021

Acknowledgements

The project “Learning and Knowledge Development Facility 2.0” is funded by the Swedish International Development Cooperation Agency (Sida) and implemented by the United Nations Industrial Development Organization (UNIDO). We would also like to acknowledge with much appreciation all project partners and stakeholders (including in particular private sector partners, and national ministries and vocational training institutions) for their collaboration and contributions.

Disclaimer

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

Table of contents

Introduction	4
Digital skills definition	4
Definition of inclusion	7
Discrepancies among countries	7
Gender digital gap	9
Main insights and conclusions	11
Social inclusion and digital skills relationship	11
Education and digital skills relationship	13
Internet access and digital skills relationship	15
Bibliography	17
Annex I	19



Introduction

Over the last few decades, the diffusion of information and communication technologies has created enormous opportunities to enhance the well-being of people. Moreover, the pandemic has sharply highlighted the importance of those technologies in our lives, accelerating the digital transition path.

As a result, the need to develop digital skills among the population has rapidly grown. A number of institutions within academia, industries and policymakers are investigating new strategies to support skills development, bridging the existing discrepancy between developed and less developed countries. One of the most crucial elements in this effort is social inclusion, in other words equal access to opportunities and resources.

This background paper aims to show first whether critical elements linked to inclusion are correlated with the level of digital skills among the population and, if so, how they are correlated. The discussion highlights the most robust relationships, outlining the importance of inclusion as an essential requirement for digital skills development. In addition, we look closely at the most powerful links in the education field.

The main findings provided by the analysis are that there is a link between the level of gender equality and inclusion and the level of digital skills held by the population. This link is even stronger in the cases of African countries.

In addition, the analysis shows that the link between digital skills and educational or vocational training is much stronger than that between such skills and the years of schooling.

Lastly, this report emphasizes that Internet access is not sufficient to guarantee digital skills development.

Digital skills definition

Globalization has led to a more competitive and, at the same time, interdependent world, pushing companies to rethink their value chains and to reconfigure them through automation and relocation [1]. As a result, workplaces have undergone profound changes, requiring a more flexible and complex structure. Information and communications technologies (ICTs) are the most crucial driving forces behind this change [2]. It is generally argued, however, that even if ICTs can create innovation, they do not support a knowledge-based economy. Indeed, workers are being asked much more often to face complex and interactive tasks, using new technical skills and knowledge [3].

Above all, digital skills are a contemporary necessity and a prerequisite for effective participation in society, allowing workers to readapt to rapid changes while enabling

companies to keep up with innovation. Digital skills have been described by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as follows: “Digital skills are defined as a range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create and share digital content, communicate and collaborate, and solve problems for effective and creative self-fulfilment in life, learning, work, and social activities at large.” This definition highlights the clear distinction between digital skills and the most common computer skills.

It is clear that the more rapid the digitalization process, the more need there is for a digitally competent population and this highlights discrepancies among countries. Even more than before, the pandemic has simultaneously increased the demand for digital skills and widened the digital gap between developed and less developed countries [4].

The European Commission has recently discussed what it terms the “European skills agenda for sustainable competitiveness, social fairness, and resilience,” outlining the overall picture of digital skills among the population [5]. Surprisingly, almost 42 per cent of the European population as a whole do not have basic digital skills, and 37 per cent of workers do not have these skills even where the market strongly requires them. Moreover, according to research carried out by the World Economic Forum [6], 54 per cent of the population will need radical reskilling by 2022. Reducing the global skills gap will add \$11.5 trillion to global GDP by 2028.

The situation in Africa is even more critical, as assessed by the International Finance Corporation (2019) study on sub-Saharan Africa. Almost 65 per cent of workers in Africa lack basic digital skills. The digital skills gap exists at all levels, but intermediate skills are those which are most critical for the region. By 2030, more than 200 million jobs requiring digital skills will be created in Africa, which means that there will be 600 million training opportunities.

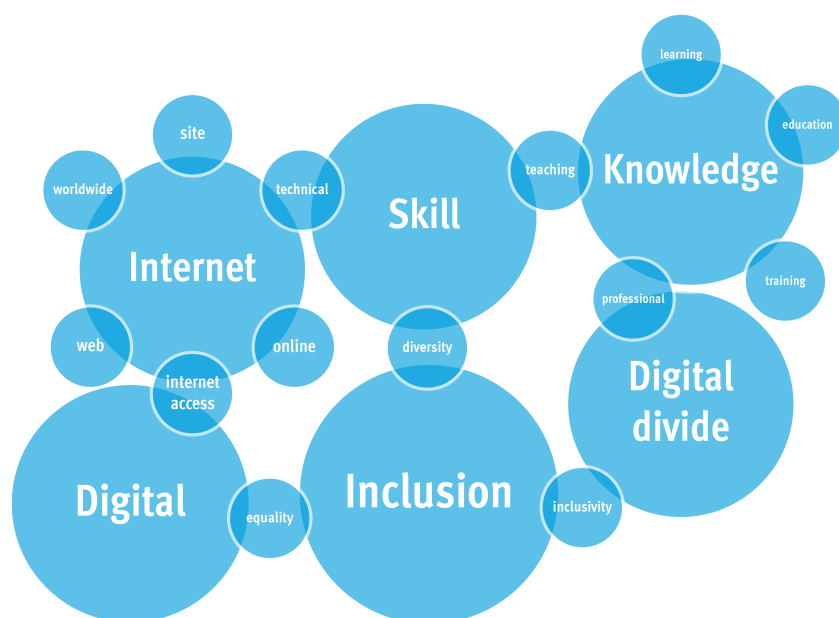
There is no doubt that, together with the need to develop new digital skills to keep up with innovation, the most crucial issue is to reduce the digital divide among countries.

It is accepted that inequalities in digital skills are mainly related to the socioeconomic structure, including the gender gap and educational background [4]. Recently the researchers Nicholas Alozie and Patience Akpan-Obong have investigated gender disparities in accessing and using ICTs in Africa. Their work shows that men are more likely than women to own and use technologies. Indeed, women are more negatively affected by such factors as socioeconomic status, domesticity, education, and traditionalism [7].

In addition to the extensive literature dealing with the determinants of the gender digital gap, some researchers have also looked into the way gender differences in labour force participation and employment patterns affect the overall adoption of ICTs [8]. This research shows that the discrepancy in employment patterns between women and men is crucial to the digital divide.

In analysing the literature on digital skills we discovered, through a text-mining analysis that captures the most relevant topics, that inclusion, the Internet, knowledge, and the digital divide are the most discussed topics in this field (*figure 1*).

Figure 1: Literature review



In analysing the literature on digital skills we discovered, through a text-mining analysis that captures the most relevant topics, that inclusion, the Internet, knowledge, and the digital divide are the most discussed topics in this field (*figure 1*).

In a recent issue of its online publication Digital Skills Insights, the International Telecommunication Union (ITU) puts forward eight main contributions to the recent discussion on digital skills

. In the introduction to this report, four principal topics are identified:

- Skills demand and supply;
- New jobs and skills required;
- New skills required by new risks: online information and data literacy;
- Gender gap, skills and employment

Three articles in particular focus on the last topic, covering numerous aspects of the gender divide and skills gap.

Ingrid Brudvig and others have looked at the barriers to Internet access experienced by women in developing countries, and propose tools to promote gender inclusiveness. Florianne and others have analysed the gender gap in the information technology (IT) industry, using data from the LinkedIn platform. They observe that the gender gap in the IT industry is more critical in Africa than in developed countries. Lastly, Babatunde Okunoye, who focuses on Africa, explores how the Paradigm Initiative approach can build digital skills capacity in Nigeria.

As a further contribution to this topic we propose, in the next section, the inclusion of some analysis to indicate whether inclusion can be considered a requirement for digital skills development.

Definition of inclusion

Inclusion – or “inclusivity” – is defined in the Oxford English Dictionary as “the practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalized, such as those who have physical or mental disabilities and members of other minority groups”.

In other words, there is a high level of social inclusion in a country when equal access to education, work, health system, and other services are ensured to the weakest groups, such as women and rural people, among others.

In the proposed paper, we focus principally on women’s inclusion in education and professional careers¹. Specifically, we want to investigate relationships between the level of integration of women in both the academic and professional fields and the level of digital skills held by the population.

Discrepancies among countries

Over the last decade, a wide range of literature has investigated the skills required by the labour force to participate in digital transformation. It is not always easy, however, to define the concepts of digital skills and literacy [9].

Over and above the numerous studies that have been carried out on specific skills, several authors have also explored the main barriers to skills development, highlighting the importance of social context and gender roles in achieving digital inclusion [10].

As a result, there are two main topics concerning digital skills: digital skills development to fill existing gaps; and the digital divide, which is more concerned with providing people with access to opportunities and resources such as the Internet.

Indeed, according to ITU data, in 2019, 46 per cent of the population worldwide was not using the Internet, even though most of them had access opportunities. This discrepancy is a reflection of the existing skills and education divides among people. Thus, education, digital skills, gender and the digital divide are closely interrelated [4].

¹ In this paper we decided to focus on the gender gap in education and professional development, owing to the large quantity of data available. By contrast, there is a shortage of data on rural populations and disabilities.

Figure 2: School-age digital connectivity (UNICEF)

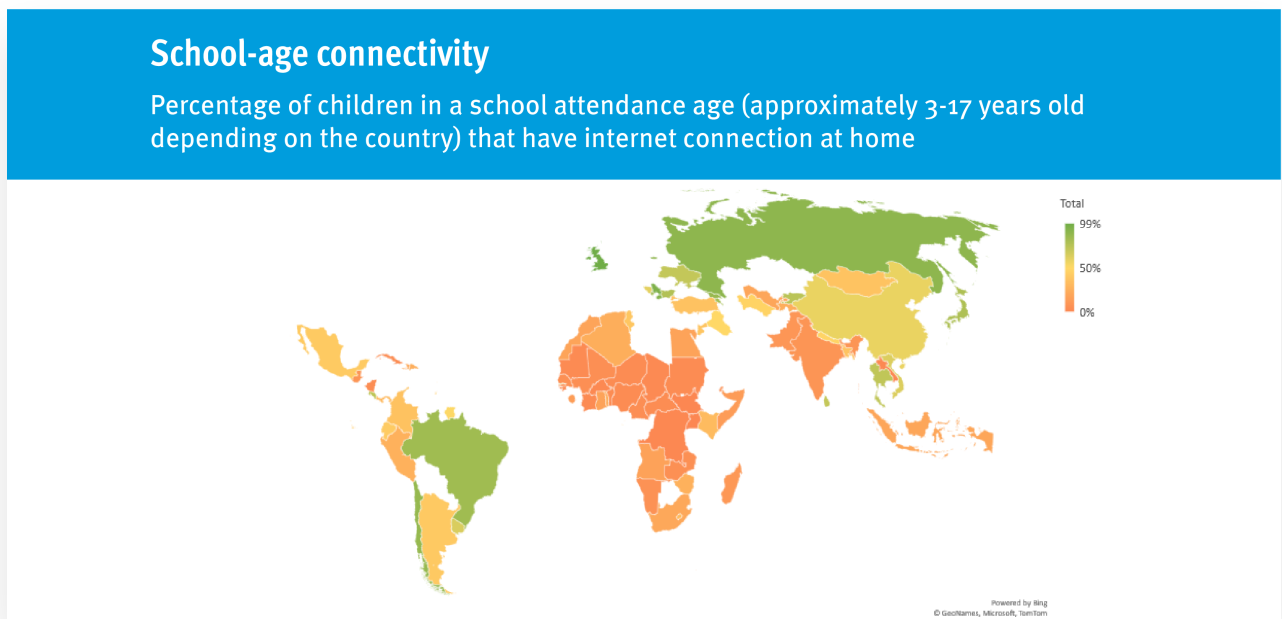
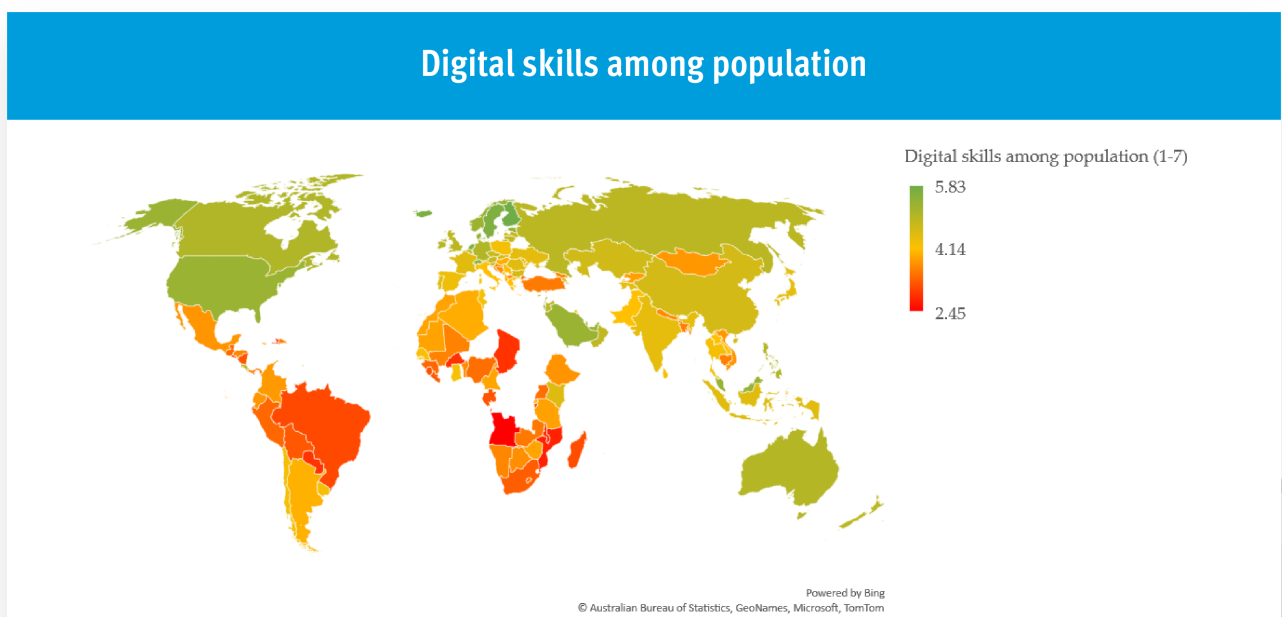


Figure 2 shows the percentage of children from 3 to 17 years old, who have access to the Internet at home.

Notwithstanding the lack of data from several regions, it is clear that African countries still face a number of obstacles when it comes to access to the Internet.

In addition, we look at the level of digital skills held by people² (figure 3).

Figure 3: Digital skills among the population (TCdata360 World Bank)



² The level of “digital skills among population” is measured by a score [ranging from 1 = not all; to 7 = to a great extent] that indicates whether the population possesses sufficient digital skills, such as computer skills, basic coding, digital reading, and others.

As shown in *figure 3*, the countries with lower levels of digital skills are primarily located in Africa and South America.

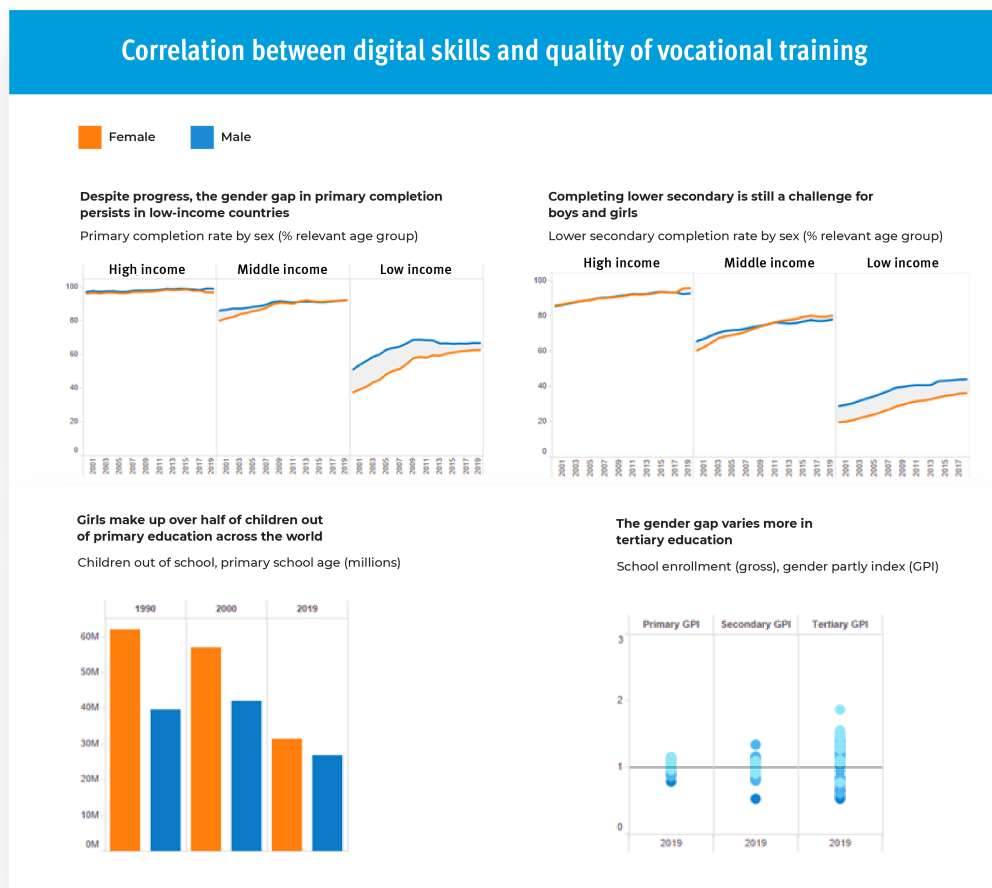
Gender digital gap

Over the last decade, a wide range of literature has investigated the skills required by the labour force to participate in digital transformation. It is not always easy, however, to define the concepts of digital skills and literacy [9].

Over and above the numerous studies that have been carried out on specific skills, several authors have also explored the main barriers to skills development, highlighting the importance of social context and gender roles in achieving digital inclusion [10].

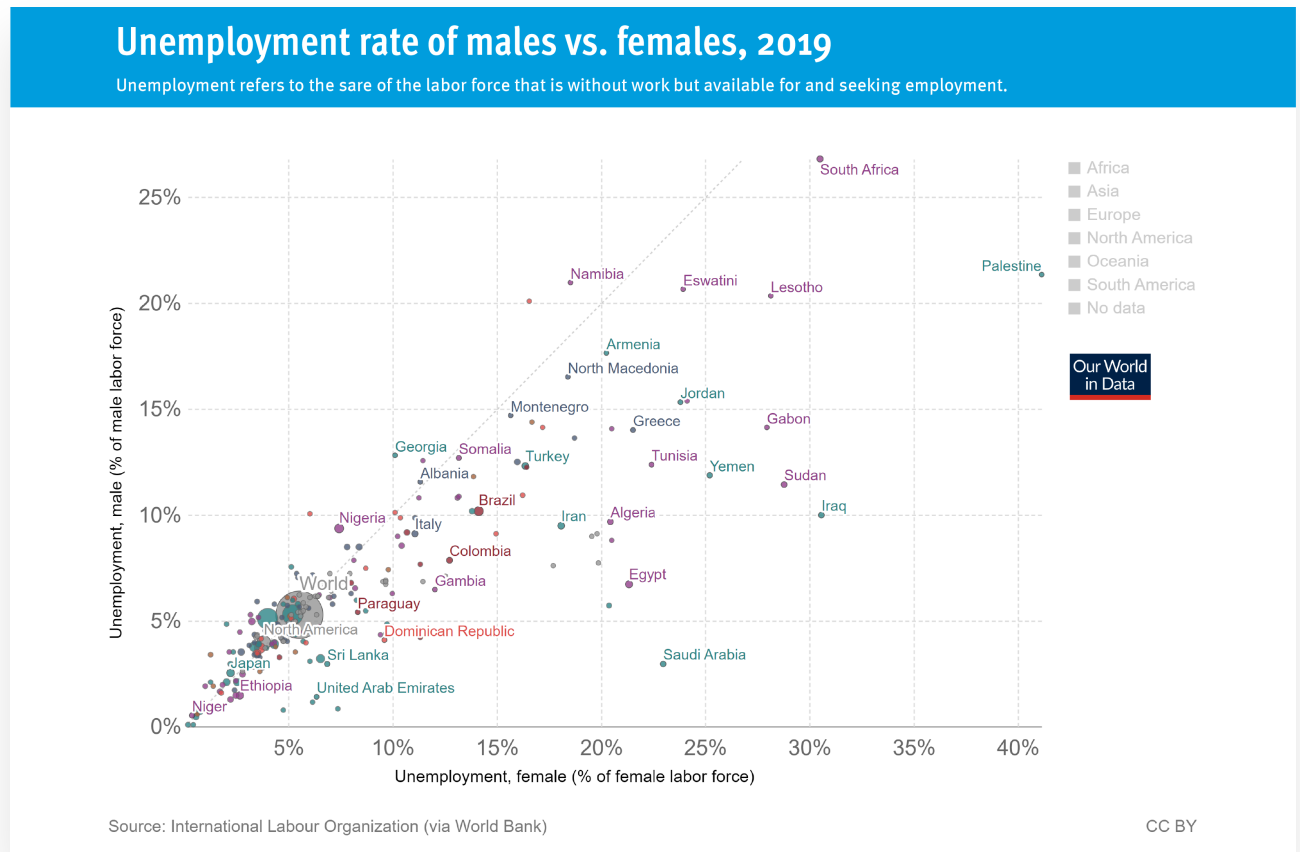
Education access remains an important area of concern in developing countries, hindering growth in the economic and social areas. In this regard, there are still some discrepancies between males and females. As shown in *figure 4*, the gender gap in primary and secondary school completion is more evident in low-income countries than in those with middle and high income levels. Moreover, the gender gap index (GPI) has the highest levels in advanced education.

Figure 4: Share of women (15-19 years old) with no education (UNICEF)



Because of a lack of education, the rate of unemployment is also critical all over the world. As shown in *figure 5*, there are many countries, in particular those in Africa, where the unemployment rate is higher among women than men.

Figure 5: Rate of unemployment: men vs. women (World Bank)



Main insights and conclusions

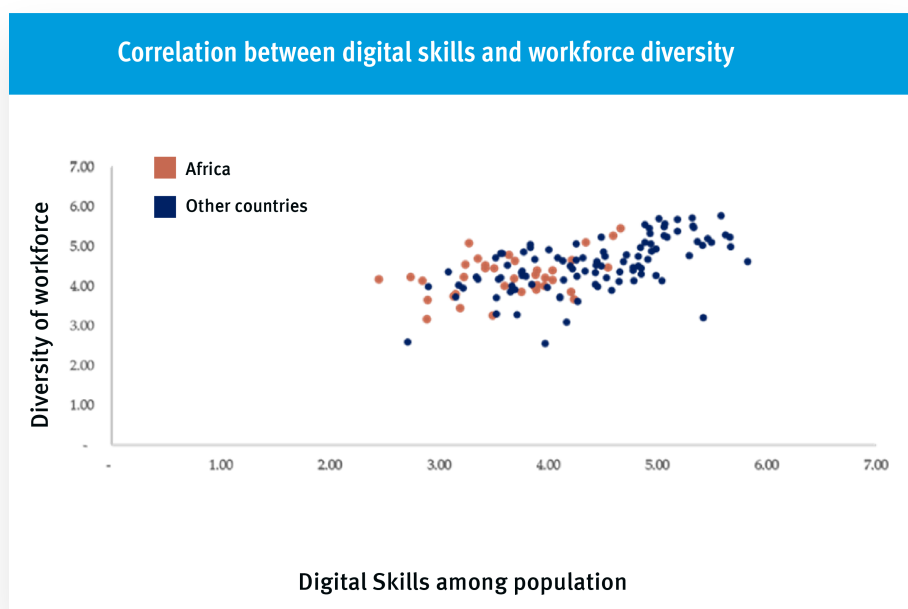
Social inclusion and digital skills relationship

This section presents some links between digital skills and the social context in various countries. Specifically, in our depiction of these links, we separated African countries from all the others. There are two main reasons why it helps to distinguish African countries from other countries. First, 70 per cent of the least developed countries are located in Africa [11].

Second, unlike all the other countries, such as those in south-east Asia , African countries appear to follow a different trajectory and are struggling to unlock their potential and missing opportunities for the economic transformation and quality employment generation needed to alleviate poverty [12].

It is a common belief that there are strong links between gender equality and the potential to access and develop new skills. In *figure 6*, we describe the relationship between digital skills among the population and what may be termed the “diversity of the workforce”³. It is clear that, besides some outliers, there is a positive relationship between the two variables. The higher or lower the level of gender equality, the higher or lower the level of digital skills in the country. In several African countries, this relationship is even stronger than in countries elsewhere in the world.

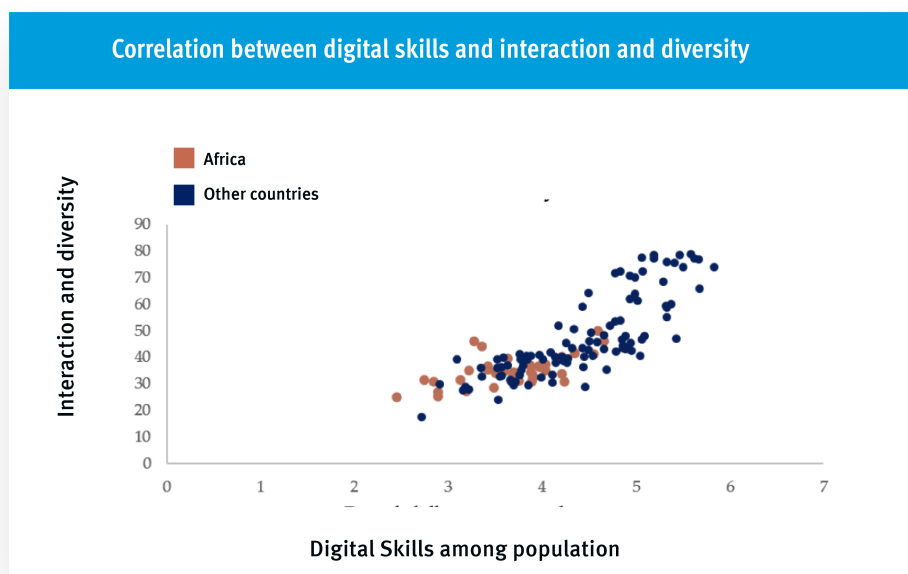
Figure 6: Digital skills and workforce diversity



³ The diversity of the workforce may be assessed from the evaluation – provided by companies – of the diversity level among the workforce, in terms of ethnicity, religion, sexual orientation and gender. This is assigned values from 1 = not at all to 7 = to a great extent (World Economic Forum Global Competitiveness Index).

This relationship may also be described with an “interaction and diversity”⁴ indicator that captures gender equality and inclusion (*figure 7*).

Figure 7: Digital skills and diversity



In this case, the relationship is even stronger, demonstrating that the more society promotes inclusivity to specific groups, such as women, the more digital skills can be attained by the population. These results may also be attributed to the fact that a higher level of digital skills means a higher level of digital inclusion and social inclusion.

For its part, digital inclusion is defined as “the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies” [13]. More specifically, digital inclusion means access to the Internet and digital devices and access to digital skills training [13]. Thus, while the “digital divide” refers to the gap between people who have access to the Internet and those who do not, “digital literacy” is related to all the skills required to use ICT. On the other hand, digital inclusion is more closely linked to all the policies implemented to “close the digital divide and promote digital literacy” [14]. In their work, Bianca Reisdorf and Colin Rhinesmith investigate the principal digital inclusion approaches to alleviating inequalities in different cultural backgrounds [15] and find that gender equality is one of the main factors affecting digital inclusion [16]. In addition, Elisabeth Unterfrauner and others have concluded that supporting skills and competencies in digital technologies lead to a higher value being placed on social inclusion [17].

⁴ The interaction and diversity have to be intended as the evaluation – provided by companies- of the gender equality and inclusion level (World Economic Forum Global Competitiveness Index)

Education and digital skills relationship

We also consider whether there is some link between the quality of and number of years spent in education and the acquisition of digital skills. *Figure 8* shows the relationship between digital skills per se and the level of digital skills possessed by secondary school graduates concerning market demand. More specifically, this variable indicates the extent to which secondary school leavers have the skills needed by businesses. Values range from 1 – “Not at all” to 7 – “To a great extent”.

Figure 8: Digital skills and skill set of secondary schools

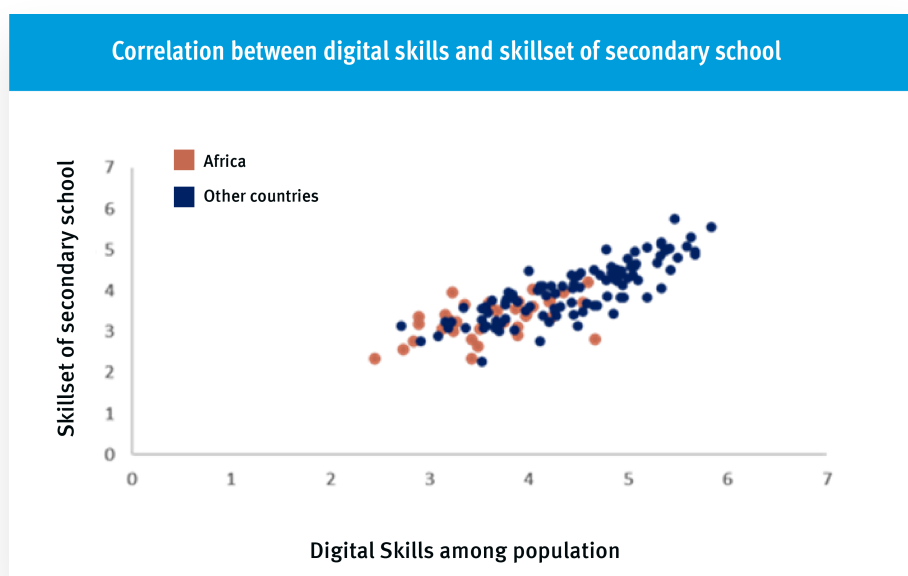
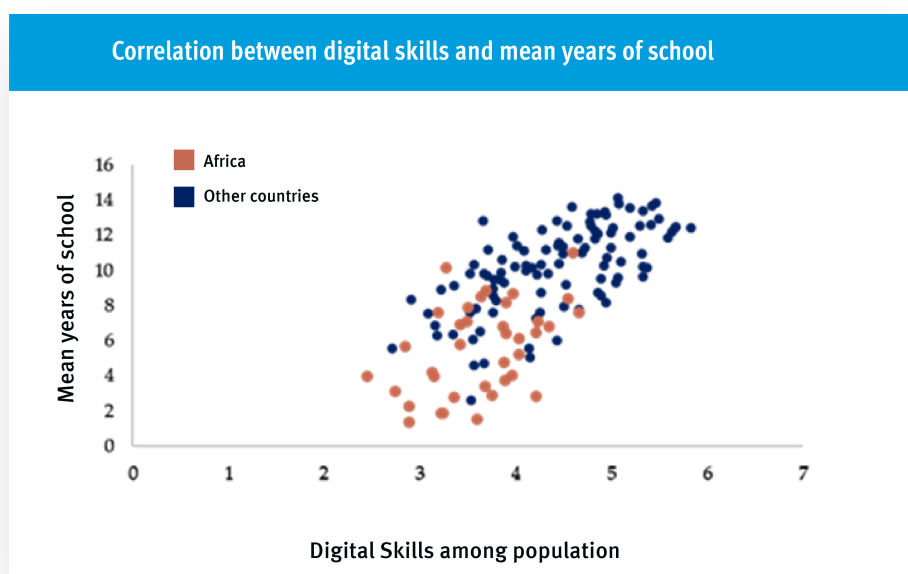


Figure 9: Digital skills and mean years of school



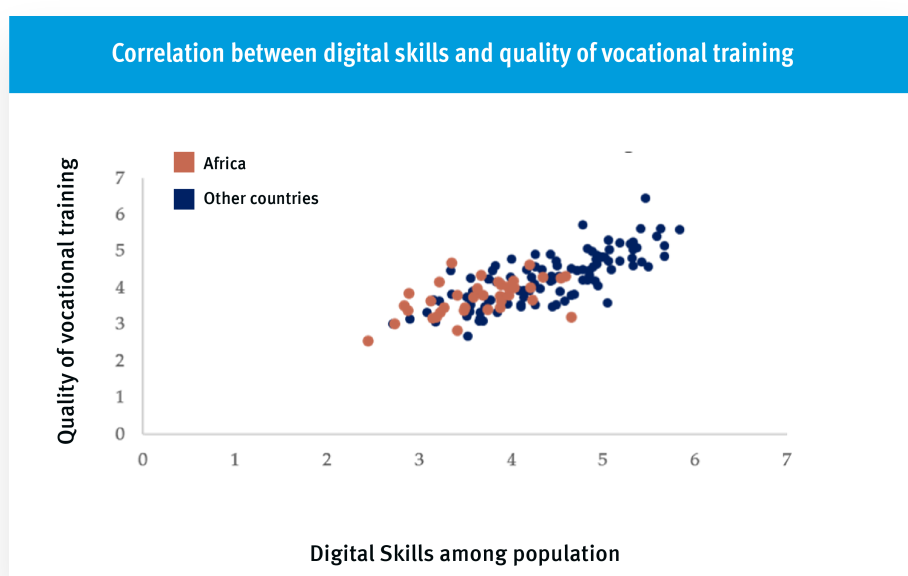
In *figure 9*, we capture the relation between digital skills and the average years of schooling⁵.

The figures demonstrate that levels of digital skills are related more to the type of education programmes offered by schools rather than to the number of years spent at school. In this context, the “skill set of secondary education” indicates the level of skills acquired during secondary school and the type of skills required by businesses.

We also try to see the link between digital skills and the quality of vocational training (*figure 10*).

Here we can see a strong link, demonstrating the importance of training in supporting skills development.

Figure 10: Digital skills and vocational training



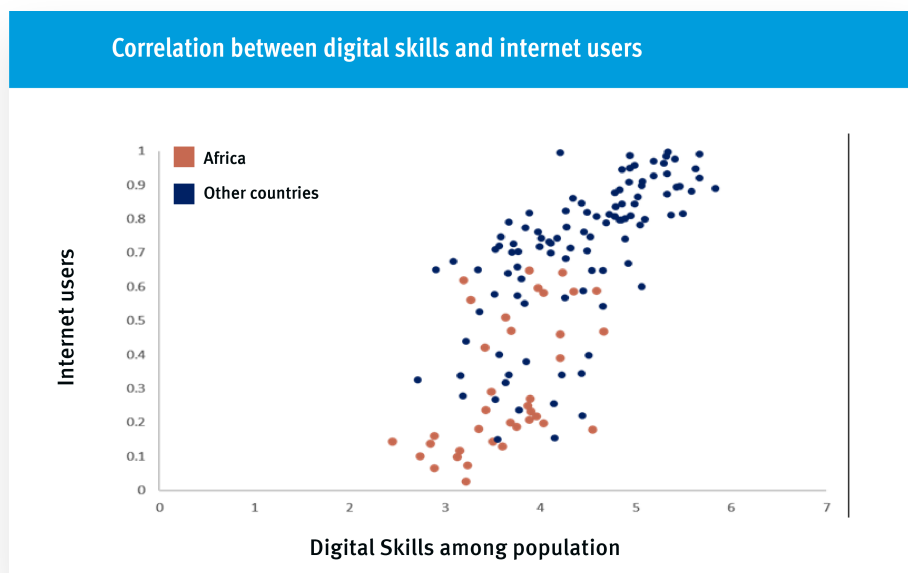
⁵ Average number of completed years of education of a country’s population aged 25 years and older.



Internet access and digital skills relationship

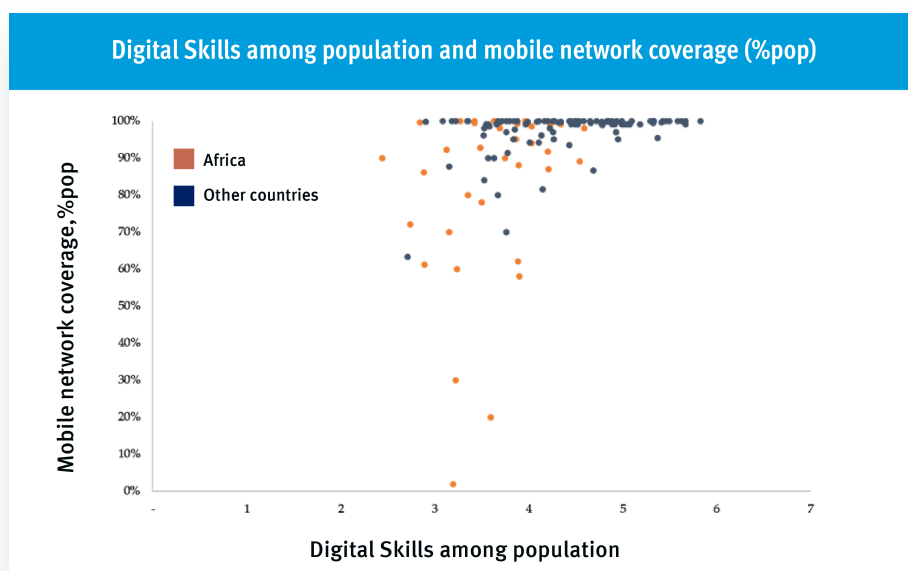
In conclusion, we investigate the link between the percentage of people with Internet access and those with digital skills (*figure 11*).

Figure 11: Digital skills and Internet users



Interestingly, the link between these two variables is less strong than other links. Previous studies have shown that one of the main barriers to digital skills is not lack of Internet access but the lack of capacity and skills of people to use the Internet and to take advantage of what it offers. Based on data provided by national telecommunications operators, the great majority of populations, specifically 93 per cent, live in areas covered by 3G signals.

Figure 12: Digital skills and mobile network coverage (% pop.)



Moreover, 82 per cent also live in areas covered by 4G signals. As a result, we have to look at other reasons why people do not use the Internet, such as the cost and quality of connection, the cost of devices, and lack of education and digital skills [4].

As may be seen in *figure 12*, the links between digital skills and mobile network coverage are not strong.

This confirms that, while Internet access is necessary, it is not a sufficient condition to allow countries to develop digital skills.



Bibliography

- [1] Roland E. Anderson, “Implications of the Information and Knowledge Society for Education.,” in *International Handbook of Information Technology in Primary and Secondary Education.*, 2008.
- [2] “21st Century Skills: What potential role for the Global Partnership for Education?” *Global Partnership for Education*, 2020.
- [3] Ester van Laar, Alexander J. A. M. van Deursen, Jan A. G. M. van Dijk and Jos de Haan, “The relation between 21st-century skills and digital skills: A systematic literature review,” *Computers in Human Behavior*, vol. 72, pp. 577–588, 2017, doi: 10.1016/j.chb.2017.03.010.
- [4] International Telecommunication Union (Development sector), “Digital Skills Insights 2020,” 2020.
- [5] European Commission, “European skills agenda for sustainable competitiveness, social fairness and resilience,” 2020.
- [6] World Economic Forum, “The digital skills gap is widening fast. Here’s how to bridge it,” 2019.
- [7] Nicholas. O. Alozie and Patience Akpan-Obong, “The digital gender divide: confronting obstacles to women’s development in Africa,” *Development Policy Review*, vol. 35, no. 2, pp. 137–160, 2017, doi: 10.1111/dpr.12204.
- [8] Hernan Galperin and Malena Arcidiacono, “Employment and the gender digital divide in Latin America: A decomposition analysis,” *Telecommunications Policy*, vol. 45, no. 7, p. 102166, 2021, doi: 10.1016/j.telpol.2021.102166.
- [9] Alexander J.A.M. Deursen and Jan A.G.N. Van Dijk, “Using online public services: a measurement of citizens’ operational, formal, information and strategic skills.,” *Lecture Notes in Computer Science*, 5184, pp. 195–206, 2008, doi: 10.1007/978-3-540-85204-9_17
- [10] Simon Engdahl and Linnea Svanberg, “Understanding the effects of non-cognitive skills and gender beliefs on digital skills: a longitudinal and comparative study across four developing countries,” dissertation for the Stockholm School of Economics, p. 6, 2021.
- [11] United Nations, “World Economic Situation and Prospects 2020,” New York, 2020.

- [12] Landry Signé, “The potential of manufacturing and industrialization in Africa Trends, opportunities , and strategies,” *Brookings Institution*, September, 2018.
- [13] National Digital Inclusion Alliance (NDIA), online platform available at www.digitalinclusion.org/definitions.
- [14] Paul T. Jaeger, John Carlo Bertot, Kim M. Thomposn, Sarah M. Katz and Elizabeth J. De Coster, “The intersection of public policy and public access: Digital divides, digital literacy, digital inclusion, and public libraries.,” *Public Library Quarterly*, vol. 31, no. 1, pp. 1–20, 2012.
- [15] Bianca Reisdorf and Colin Rhinesmith, “Digital inclusion as a core component of social inclusion,” *Social Inclusion*, vol. 8, no. 2, pp. 132–137, 2020, doi: 10.17645/si.v8i2.3184.
- [16] Lidia Arroyo, “Implications of digital inclusion: Digitalization in terms of time use from a gender perspective.,” *Social Inclusion*, vol. 8, no. 2, pp. 180–189, 2020, doi: 10.17645/si.v8i2.2546.
- [17] Elisabeth Unterfrauner, Margit Hofer, Bastian Pelka and Marthe Zirngiebl, “A new player for tackling inequalities? Framing the social value and impact of the maker movement,” *Social Inclusion*, vol. 8, no. 2, pp. 190–200, 2020, doi: 10.17645/si.v8i2.2590.



Annex I

Correlation Coefficient	Diversity of workforce	Interaction and diversity	Skillset of secondary school	Mean years of schooling	Quality of vocational training	Internet users	Mobile network coverage
Digital skills among population	0.75	0.81	0.83	0.69	0.76	0.7	0.4

Observations	Diversity of workforce	Interaction and diversity	Skillset of secondary school	Mean years of schooling	Quality of vocational training	Internet users	Mobile network coverage
Digital skills among population	119	137	139	139	139	139	136

Pi value	Diversity of workforce	Interaction and diversity	Skillset of secondary school	Mean years of schooling	Quality of vocational training	Internet users	Mobile network coverage
Digital skills among population	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001





Vienna International Centre
Wagramerstr. 5, P.O. Box 300,
A1400- Vienna, Austria



+43 (1) 2026-0



www.unido.org



unido@unido.org



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION