THE FUTURE OF WORK
AND EDUCATION FOR THE DIGITAL AGE

Bridging the Gap Between Digital Skills and Employability for Vulnerable Populations

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Abstract

While digital technologies are spreading rapidly, mismatches in desired digital skills between education and industry pose an ongoing challenge for the future of work. Some segments of the population are ill-prepared to fill jobs that will require at least a basic set of digital skills. With rapid technological advancement, traditional and emerging learning deficits can put them at greater socio-economic risk by exacerbating inequalities and unemployment. This brief provides recommendations to bridge the digital skills divide and foster the employability of those vulnerable populations, which can lead ultimately to larger macroeconomic outcomes such as poverty reduction, income growth, and economic empowerment.

Challenge

The fourth industrial revolution is raising challenges for the future of work, as digitalization, automation, robotics and artificial intelligence (AI) generate opportunities for the economy and society (Bughin et al., 2018; Frey & Osborne, 2017; McKinsey Global Institute, 2018; OECD, 2018a). While routine and manual tasks are being automated, new types of jobs are being created. The World Economic Forum predicts a net loss of 5 million jobs in 15 developed and emerging markets by 2020 (WEF, 2016a; 2016b). Virtually, all sectors and geographical regions will be affected, with a growing number of workers needing reskilling an upskilling. Those in low-skilled jobs in such industries as agriculture, textiles, and manufacturing will be particularly vulnerable. According to some estimates, as many as two thirds of all jobs, mostly in developing countries, could be at risk (WEF, 2016a). Shortages and mismatches in desired digital skills also pose an ongoing challenge worldwide. It is estimated that 9 out of 10 jobs will require digital skills in the future (United Nations, 2018). Presently, however, less than one half of adults possess such skills (OECD, 2016), while half of the world's population still does not have access to the Internet (International Telecommunication Union, 2018; Hernandez & Roberts, 2018).

As vulnerable populations are more likely to be excluded from the digital economy and therefore from the workforce, digital literacy approaches should specifically address their needs. As highlighted by Chetty et al. (2017), "impoverished communities with limited capabilities have fewer opportunities to gain the skills needed to advance within the rapidly transforming digital economy." Even when Information and Communication Technologies (ICT) and connectivity are made available and affordable, these segments face numerous challenges in accessing and using digital technologies.

Failing to create targeted measures for addressing the needs of vulnerable populations will widen the skills gap over time as rapid technological change continues. Bridging the divide between education and employment has been found to result in significant "digital dividends" for disadvantaged populations (Bolstad et al., 2012; Chetty et al., 2017). This includes increases in human and social capital accumulation, productivity, employability, and earnings potential (OECD, 2015). The ultimate result can be poverty reduction, income growth, and the creation of a pathway to long-run economic empowerment

and financial independence, leading to more dynamic and inclusive economies worldwide (The World Bank, 2016).

Countries, intergovernmental organizations, and NGOs have been promoting digital skills development for at least the last two decades. However, to date, limited attention has been given to identifying practical solutions for those populations most at risk of being left behind.[1] Targeted actions are required to manage the current transition and build a future workforce where all members of society have equitable opportunities to acquire the digital skills needed to be competitive in the digital age.

Proposal

The G20 has been among those actively engaged in bridging the divide between skills, training and employability. The 2010 G20 Training Strategy highlighted the early vision and the anticipated needs and challenges that the labor market was likely to face (ILO, 2010). More recently, under the G20 German Presidency, high-level policy discussions focused on the role of digital skills and digital inclusion in promoting occupational and social participation (IMF, 2017; Kirton & Warren, 2018). Under the Argentina Presidency, there was the inclusion of *"Education*" as one of the main strategic areas, as well as the creation of the T20 Task Force on *The Future of Work and Education for the Digital Age*. The work conducted last year by the Task Force highlighted the strong interdependence between technology-driven transformations and the critical role that formal, informal and non-formal education need to play in preparing students and employers for a dynamic and constantly changing labor market. The advantages of all these efforts can be multiplied through policies targeting vulnerable populations.

As a next step, *the G20 should focus on addressing the digital skills divide and challenges facing vulnerable populations, as well as their relation to the future*

[1] The United Nations E-Government Surveys show that governments around the world have only recently started to include vulnerable populations as part of their efforts to address the changes in job markets and the need to reskill and upskill the global workforce (United Nations, 2012, 2014, 2018). On request of the G20 German Presidency, the OECD conducted an assessment of member states' digitalization policies for disadvantaged groups. While these efforts provided an initial framework towards adopting practical digital solutions for vulnerable populations, the work was preliminary in nature (OECD, 2018b).

of work. To this end, the following set of specific recommendations are provided, using a *glocal* approach that focuses on combining global strategies for digital skills acquisition with local socioeconomic community needs. This includes, but is not limited to:

1. **A multilevel educational approach to bridging the digital divide for vulnerable populations**

1.1 Reforming existing education systems to better prepare vulnerable students: Some schools do not provide digital training, and if training is available, it may not be compulsory (Chetty et al, 2017). The G20 needs to assist member states in extending basic, intermediate, and advanced digital skills beyond schools to create a wider range of educational pathways to acquiring these skills for vulnerable and disadvantaged populations across member states. These groups may be children and youth, but also adult learners such as the poor, the less educated, the unemployed, women, the elderly, the disabled, migrants and refugees, those in rural areas, or any group ill-prepared to participate in a digital environment.

To this end, the G20 can establish a task force to draft a digital skills development strategy such as that proposed by ITU (2018). This strategy would identify the digital skills development goals at the primary and secondary levels, as well as at the tertiary level for technical and vocational education and training (TVET) programs, and colleges and universities. The G20 would then be able to promote the adoption of capacity-building and TVET for vulnerable populations in those areas and professions where there will be high demand, directly linking education to skills training and to the labor market. Education and training can, and must, play a key role in bridging the digital skills divide by addressing the specific skills needs for vulnerable populations.

1.2 Endorsing and supporting a life-long learning framework (from "cradle to grave"): The G20 can assist in mapping out the specific socio-technical knowledge and skills needed to reach a wide range of demographic and socioeconomic subpopulations at formative stages in their lives (Lyons, Kass-Hanna, Zucchetti, & Cobo, 2019). To this end, ensuring *equity in learning* and creating opportunities to upskill and retool throughout one's lifetime need to

be the priority (Bolstad et al., 2012).

1.3 Enabling and promoting internship and apprenticeship programs: These opportunities will help students to have earlier exposure to career pathways and critical employment sectors that are using digital skills. Such efforts may be particularly helpful in highlighting to students the direct benefits between education and employability, reducing school dropout rates, grade repetition, and improving student performance. Scholarships and other forms of government funding can increase the effectiveness of these programs by supporting student engagement and creating financial incentives for participation and program completion. Programs should be designed and implemented in direct partnership with public and private sector institutions and employers to help them plan for future skills, address future workforce needs, introduce new employment practices, shift work cultures, and train and integrate vulnerable populations into the work environment. Digital skills training can also be combined with entrepreneurial and business skills, introducing participants to the basics of online and digital work environments. Onsite workplace training programs targeting low-skilled workers and aimed at upgrading their competences are also needed.

1.4 Facilitating the creation of alternative and non-formal educational models for digital training: These educational models can also be an effective means to help bridge the gap between schooling and employability, and provide a framework for skilling, reskilling and upskilling vulnerable workers. Such efforts are particularly important for providing workers with market-related digital skills that can meet the evolving needs of employers within various industries in the public and private sectors (Cobo, Zucchetti, & Rivas, 2018). To this end, training programs should be adapted to the various needs of workers of different socioeconomic backgrounds and skills levels, so that no one is left behind.

1.5 Offering more individualized and flexible learning opportunities: Beyond traditional degree-based education, non-degree TVET programs can be offered both online and in person. The G20 can encourage learning and certification models that facilitate the upskilling and reskilling of the workforce, especially the most vulnerable who often face barriers in obtaining a traditional educational degree. TVET programs could offer credentialing in

digital skills that would be widely recognized and accepted by employers in a variety of fields and industries. Over a lifetime of learning, individuals could assemble, or "stack up," a series of formal and non-formal credentials (such as certificates, licenses, badges, apprenticeships, etc.) to build up digital skills qualifications which would facilitate employability or even employment mobility.

Opportunities to better harness the power of technology driven learning environments also need to be examined. Digital learning platforms such as e-learning programs, online training and course offerings, and interactive self-learning websites allow for faster, wider, and more efficient dissemination of digital literacy and transfer of skills. They also tend to have greater reach due to their scalability, sustainability, and affordability, especially for vulnerable populations where costs and a general lack of infrastructure are still prohibitive factors to skills development (Hernandez & Roberts, 2018; Taylor, 2017). Other low-cost and accessible alternatives gaining attention are makerspaces (Bertot et al., 2014; Bertot et al., 2015).[2] These learning models create an inventing-type environment where people can gain hands-on experience in technical areas like coding, machine learning, and robotics while also developing soft skills such as problem solving, critical thinking, creativity and innovation, entrepreneurship, and leadership.

2. Creating instructional resources with digital content for underrepresented populations

2.1 Promoting the creation of personalized and targeted educational content focused on the specific needs of vulnerable communities: Developing content that is adapted to different needs and capabilities is essential to facilitating the learning process and enhancing learners' interest and motivation in using digital technologies. Promoting the development of teaching resources and instructional materials that include digital content has been at the center of international discussions regarding ICT and Internet-related policies for several years (ITU, 2018). This includes the work of the United Nations

[2] http://www.makerspaceforeducation.com/makerspace.html

Internet Governance Forum (IGF) and its Best Practice Forum for Local Content.[3]

The development of digitally-relevant resources and platforms at the local level and for specialized target populations remains essential to fostering Internet use and digital technologies adoption among the most vulnerable. Most educators, however, still find it difficult to identify educational curricula and other resources that include digitally-enriched content (ITU, 2018). Educational systems are often faced with having to develop curricula materials, courses, and programs where none currently exist. Or, they have to adapt or rebuild existing programs if content is seriously lacking. There is the added challenge that schools located in poorer communities still do not have the resources to purchase even the most basic digital infrastructure such as computers, printers, software, internet connectivity, etc.

Educational systems can form public-private partnerships in the design phase to ensure the development of relevant digital skills resources. With guidance from key stakeholders and expert communities (e.g. the IT industry and digital education companies), the G20 can also provide guidelines and recommendations about the specific educational curricula and programs that are needed to address the digital divides to increase equity and inclusiveness. Guidance on teaching methods for effectively incorporating new digital content into the classroom in an interesting, holistic and future-oriented manner for diverse leaners can, and should, also be included.

2.2 Moving away from a one-size fits all digital education strategy: This is particularly important as localized content is culturally sensitive, especially to gender and race/ethnicity issues (Antonio & Tuffley, 2014; Lyons, Grable, & Zeng, 2019; Lyons & Kass-Hanna, forthcoming; Mishra, 2017; Mariscal, Mayne, Aneja, & Sorgner, 2019; Robinson et al., 2015). Moreover, language barriers remain a relevant challenge, considering that most digital content is in English, including programming and coding (Internet World Stats, 2018). Thus, the development of digital content and instruction in the learner's native language can offer a key pathway to overcoming language barriers. Also, women and minority groups should have equal access to and usage of

[3] http://www.intgovforum.org/multilingual/content/bpf-local-content-0

digital education and training opportunities, especially since they are expected to be hardest hit by the digital revolution (Hernandez & Roberts, 2018; WEF 2016a). This is particularly critical since women and minorities remain underrepresented in STEM. G20 member states can launch national campaigns and multi-stakeholder initiatives and offer incentives that encourage more women and minorities to pursue educational degrees and careers in the STEM fields.

3. Delivering digital content to vulnerable populations

3.1 Developing robust pedagogical competencies among instructors: Even when content is available, most educators are not necessarily equipped with the digital expertise, experience, and confidence in how to effectively integrate digital skills into their teaching and learning activities, especially when it comes to meeting the needs of vulnerable populations. Instructors need to be able to collaborate with other partners in the community who can provide specific kinds of expertise, knowledge or access to hands-on, real-world learning opportunities that they may not be able to access. Member states can incentivize private and public organizations (e.g., IT and tech companies, small businesses, start-ups, research parks) through tax incentives and/or other public policies to develop and implement digital skills trainings to assist educators in retooling and upskilling disadvantaged populations. At the top of formal training programs, this might include summer courses, workshops, apprenticeships, job shadowing, and short-time employment opportunities for the educators themselves.

3.2 Creating the educational environment to insure inclusivity of all citizens: Future-oriented learning approaches need to be shaped by an education system that is built around the learner, rather than the learner being required to fit with the system (Bolstad et al., 2012). Moreover, this future-focused education system should be one that shifts from providing learners with knowledge to store up for later use in their lives, to focus on equipping them to "work" with knowledge and to use it in new contexts and creative ways. Teachers' main job should not be limited to transmitting knowledge, but to

helping their students effectively use their knowledge to engage with digital technologies through direct and autonomous application.

Some examples of success have been in the field of gamification where the principles of gaming are being incorporated into the classroom to bring the "power of play" to engage, inspire, and immerse students in learning while simultaneously fostering higher-order cognitive and socioemotional skills (The World Bank, 2016). Educational experts have found that game-based learning can be an effective means to building digital and non-digital skills in the classroom. Other best practices have incorporated computational thinking and coding into schools via the use of data hackathons, programming bootcamps, after-school programs and tech clubs.

3.3. Taking advantage of existing online training and platforms: Efforts can be made to promote the adoption of online interactive training and education platforms that build data science skills via courses, skills tracks, career tracks, and also hackathons and bootcamps. Using these types of platforms (e.g. code.org, DataCamp.com), students and adult learners can network with employers and apply for jobs that match their specific data skills. There can even be platforms for instructors who want to integrate digital content and activities into existing curricula and lesson plans. *Pursuit* is one such successful model that specifically targets at-risk populations. Located in the United States, this NGO recruits individuals from low-income, underserved communities, teaches them programming over an intensive 10-month or 36-month bootcamp, and then helps them find employment and build meaningful careers in software development.[4]

4. Harnessing the power of public-private collaborations

4.1 Facilitating more active engagement and coordination between education and the private and public sectors: Broader consensus and support needs to be built around the digital skills needed of vulnerable populations. Schools play a critical role in digital skills development – imparting digital knowledge and providing the learning pathways in which knowledge and skills can be

[4] https://www.pursuit.org/

applied. Yet, there are many other key stakeholders within the digital skills ecosystem that need to be included in this process, especially when it comes to addressing the skill needs of those most at-risk. These stakeholders include: employers, other private sector entities, the government sector, civil society organizations such as NGOs, TVET institutions, public libraries, community and technology centers, other non-formal providers of digital skills and lifelong learning, and many others.

Successful models of stakeholder engagement often include the creation of organizational bodies such as coalitions and councils, task forces, cooperative alliances, and digital skills forums. An organizational body such as this can be established to move forward under a clear and focused digital skills framework to accelerate the digital skills development of critical populations. Activities may include: (1) assessing digital skills needs, (2) reviewing current policies and programs, (3) establishing digital skill goals, and tracking progress towards meeting them and reducing digital skills gaps for the most vulnerable, (4) identifying and monitoring workforce needs and new technological developments, and (5) maintaining connection and relevance through participating in regional and global campaigns and fostering new partnerships.

One successful model of engagement has been the European Commission's Digital Skills and Jobs Coalition Initiative, which is part of the EU's New Skills Agenda for Europe (European Commission, 2016, 2017a, 2017b).[5] The Coalition invites all types of organizations in the EU to become members, as long as they are committed to advancing the objectives and principles outlined in the Coalition's charter with regards to the EU's digital skills strategy. This initiative has compiled a repository of Europe's best digital skills projects, which is searchable by target group and keyword to assist organizations in finding projects that best meet their needs. Collaborations such as these are needed at every level (from local to international), and attention must be given to specifically addressing the needs of the most vulnerable groups.

[5] https://ec.europa.eu/digital-single-market/en/digital-skills-jobs-coalition

4.2 Creating an international community to develop a more coordinated digital skills strategy: A collaborative body can be established with the specific aim to advance digital literacy, training, reskilling, and upskilling of underrepresented populations. Similar to the EU's coalition, this collaborative body can inventory existing best practices, policies, strategies, and programs globally that support the development of digital skills for at-risk groups. Through this platform, the G20 member states can also build teams and cross-cutting partnerships to address more localized or regional issues, while also facilitating the exchange of ideas and best practices and allowing participants to provide guidance and technical assistance to each other. This is also likely to include a sharing of digital literacy metrics, digital content, curricula and learning pedagogies, training materials, online learning platforms and offline training programs to upskill both students and instructors. Smaller communities of practice can be created around the needs of specific target populations that may have more specialized needs such as migrants and refugees who also have general education and health needs (Alam & Imran, 2015; Lyons & Kass-Hanna, forthcoming; O'Mara & Harris, 2016; UNESCO, 2018).

Conclusions

The current policy brief has aimed to address the digital skills divide affecting vulnerable populations, and its potential impact on the future of work. Despite the efforts to bridge the digital divide, major challenges remain across several dimensions such as connectivity deployment, promoting digital skills acquisition in formal education and non-formal education settings, and linking skills training to the labor market. Unless policies specifically address the digital divide affecting vulnerable populations, there is a high risk of increasing inequities and unemployment in the years to come, with relevant implications for societies at large. All stakeholders including governments, the private sector, academia and civil society, need to revisit strategic frameworks for digital inclusion to assess barriers that may still be creating digital exclusion for disadvantaged and vulnerable groups, especially as it pertains to barriers to digital knowledge, skills training, and potential employability. The

G20 is the international organizing body that is best positioned to combine these efforts into a cohesive and integrated strategy for improving digital skills for citizens worldwide, and especially for those groups most vulnerable to the digital transformation.

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