

## *Executive summary*

New digital technologies, including information and communication technologies (ICTs), artificial intelligence and robotics, are reshaping the way people live, work and learn. Digitalisation presents immense potential to boost productivity and improve well-being. It can give people more power over what they learn, where and when they work, and how they engage in society. However, it can also increase inequalities if some people or regions are left behind. By improving the skills of their populations, countries can ensure the new technologies translate into better outcomes for all. This requires a comprehensive and co-ordinated policy intervention, with skills-related policies as the cornerstone of this package.

### **Skills are crucial to thrive in a digital world of work and society**

#### ***Skills help bridge social divides in the access and use of digital devices***

A growing number of everyday activities can be performed online. While not everyone needs to carry out complex and diverse tasks using new technologies, people should be able to build the skills they need to join the digital world.

- As broadband Internet access expands, the lack of adequate skills has become an increasingly important reason why some people do not have Internet at home. As Internet use expands, the digital divide – which initially concerned gaps in Internet access – is increasingly defined by the different ways in which people are able to use the Internet and the benefits they derive from their online activities.
- A good level of literacy, numeracy and problem-solving skills in technology-rich environments is the key that allows people to unlock all the benefits of Internet use and use the Internet in diversified and complex ways rather than just for information and communication.
- Navigating the web is becoming increasingly complex. Internet users require conceptual and cognitive skills to grasp what lies behind online information. Different sets of cognitive skills have different impacts on the types of actions people take on line. A good level of cognitive skills also increases the likelihood that people protect their privacy and security on line. More skilled parents and children may also be better prepared to counter the risks of cyberbullying or excessive Internet use.

#### ***Skills help workers adapt to changing labour markets in a digital world of work***

Digitalisation is transforming the way many jobs are carried out. The pace at which new technologies are being developed is accelerating, raising anxieties about whether they will soon make some workers redundant. At the same time, the digital transformation is creating new opportunities and jobs. Reaping the full benefits of digitalisation will ultimately depend on the ability of each country to develop a set of policies that help workers adapt to these changes and develop relevant skills to thrive in the digital world.

- Technology can replace workers in routine tasks that are easy to automate and complement workers in tasks that require creativity, problem solving and cognitive skills. As machine learning and artificial intelligence advance in many sectors, a growing number of workers may need to move from declining occupations (which are highly intensive in low-skilled routine tasks) to growing ones (which are characterised by high-level, non-routine cognitive skills).
- To thrive in the digital workplace, workers will need not only digital skills but also a broad mix of skills, including strong cognitive and socio-emotional skills. High-level ICT skills will also be increasingly important in growing occupations linked to new technologies.
- Countries are facing important training challenges. Training policies will need to facilitate the transition of workers whose jobs are at high risk of being automated into new and better-quality jobs. As labour markets evolve in response to digitalisation, governments need to find the right balance between policies that foster flexibility and labour mobility, and policies that ensure job stability.
- As technology alters the importance of certain jobs in the labour market, governments will need to invest in education and training that helps workers to change job or even occupation so that they can benefit from new job opportunities and reduce the risk of losing their jobs.
- This report adopts a pragmatic approach and analyses the skills distances that separate occupations at high risk of automation from others. It looks at the cognitive skills and the skills involved in performing tasks on the job that are required for workers to change occupation and how much training is needed to facilitate these transitions. Acceptable transitions, with moderate wage reductions and limited skills excesses, can be identified for just over half of occupations with a small training effort.
- Preliminary analyses suggest that the implied training costs of helping workers move away from occupations at risk of automation can be substantial but are difficult to assess precisely. The costs of enabling labour market transitions will vary from country to country, reflecting factors such as differences in the shares of employment in jobs at high risk of automation, the costs of education and training policies, the indirect costs of training, and the occupational and skills distributions of the population.

### **Countries are unequally prepared to seize the benefits of digital transformation**

- A small group of countries, including Belgium, Denmark, Finland, the Netherlands, New Zealand, Norway and Sweden, are ahead of other countries in their exposure to digitalisation. Their populations are also well equipped with adequate skills and supported by effective lifelong learning systems that enable them to benefit from digitalisation.
- Other countries, such as Japan and Korea, have great potential to make the most of digital transformation but need to adopt a range of policies to ensure older workers and adults are not left behind.
- In Chile, Greece, Italy, Lithuania, the Slovak Republic and Turkey, individuals and workers often lack the foundation skills necessary to flourish in a digital world. In

these countries, lifelong learning systems, both formal and non-formal, need to be strengthened substantially to enable upskilling or reskilling throughout life.

## Developing a comprehensive policy package with skills-related policies as a cornerstone

### *Digitalisation brings many new learning opportunities*

In schools, the use of technology can help students develop skills for a digital future, foster innovative ways of teaching and mitigate school failure. Access to ICT infrastructure in schools is widespread in most OECD countries: by 2015, almost 9 in 10 students had access to computers in schools. However, mere access to and use of computers is not enough to enhance student performance. Technology's effect on student outcomes depends on how it is integrated in the classroom to support teaching and learning practices. Teachers' digital competencies are instrumental to make the most out of new technologies in the classroom. Many countries should revisit the way technology is integrated into the curriculum and into pedagogical practices.

Open education and massive open online courses (MOOCs) offer new ways to acquire and diffuse knowledge, and develop skills throughout life. Highly educated and highly skilled adults are still more likely than low-skilled adults to use MOOCs, however, so their potential for skills development could be exploited further.

### *Policies need to support lifelong and life-wide learning for all*

Strengthening lifelong learning is key for all workers and citizens to adapt to changes in the world of work and in society. International evidence shows that strong lifelong learning systems rely on a combination of targeted policies that enhance the accessibility and quality of education and training provision across all stages of life and all types of learning.

Countries can foster lifelong learning by addressing inequalities in learning opportunities throughout life, adapting the school curriculum to changing skills requirements and providing more effective training to teachers. They also need to ensure that adult education and training systems can respond to labour market changes, and to adapt systems of recognition and certification of skills to ever-evolving skills needs.

### *Policies also need to mitigate the geographical impact of digitalisation*

The benefits of digitalisation have been highly concentrated in cities and high-tech regions, although there are signs that some firms start to take advantage of digital technologies to locate outside high-tech regions and escape high living costs. Open education and MOOCs can also help bridge geographical divides, by providing access to tertiary education for young people and workers and offering high-quality educational and training resources to teachers in schools. In this way, new technologies can mitigate inequalities due to an absence of high-quality teachers, a lack of training opportunities or a lack of access to sources of information. However, skills gaps emerge at an early age between children of different socio-economic status and different geographical location. To bridge these gaps and help lagging regions catch up, high quality skills-related policies are needed, extending from early childhood education to vocational education and training, as well as equal opportunities to continue education.

***The policy effort needs to be co-ordinated***

The need to foster lifelong learning and the need to prevent geographical inequality both require a comprehensive approach to digital transformation that co-ordinates a range of skills and development policies and actors. As highlighted in the OECD's Going Digital and Future of Work initiatives, close alignment is crucial between policies on education, the labour market, tax, housing, social protection, development, and research and innovation. Skills-related policies must form the cornerstone of this policy package so that digitalisation enhances well-being and productivity. The OECD stands ready to work with countries and to play its part in the collective effort to ensure everyone thrives in a digital world.



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