BETTER POLICIES FOR BETTER LIVES

International Labour Office
Geneva

Global Skills Trends, Training Needs and Lifelong Learning Strategies for the Future of Work

Report prepared by the ILO and OECD for the G20 Employment Working Group

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Executive summary

This paper reviews how the megatrends – digital transformation, globalisation and demographic changes - are shaping skills demand through the creation and destruction of jobs as well as the changing nature of existing occupations. It examines how the resulting changes in skill needs have translated into skills imbalances, and considers how lifelong learning (LLL) systems and strategies can be enhanced to increase the participation of individuals and employers in education and training.

The world of work is undergoing major changes

The world of work is undergoing rapid and deep changes brought about by technological development, demographics, globalisation and climate change. These trends are affecting the composition of employment, the nature of the tasks carried out at work and the skills required in the labour market. They are also putting enormous pressure on traditional education and training systems, calling for improved quality and new approaches to lifelong learning. Skills development can help turn these challenges into opportunities. Skills contribute to productivity increases and are instrumental in enabling people to benefit from new job opportunities. At the same time, lifelong learning and active labour market programmes (ALMPs) along with social protection measures are important "buffers" to help workers manage transitions between jobs and enterprises adjust to change while avoiding high social costs.

In many G20 countries, the demand for high-level cognitive and social skills is rising while job losses concentrate in jobs with a high routine content

In many G20 countries, the composition of employment is shifting towards jobs that require high-level cognitive and socio-emotional skills or are characterised by non-standardised tasks, while jobs with a high routine content are being automated or offshored to varying degrees. Not only has this generated labour market polarisation but constitutes a major challenge for education and retraining systems as the jobs destroyed and those created require very different sets of skills. The transition is proving particularly challenging for low-skilled workers needing significant retraining and facing major financial and non-financial barriers to participation.

In a small number of G20 economies, the supply of skilled workforce still outstrips demand

The widespread discourse of rising skill requirements coupled with automation destroying jobs may still be a distant prospect for a number of the G20 emerging economies where a relatively low-skilled workforce is matched by the limited demand for high-level cognitive skills. In these countries the supply of highly skilled workers tends to outstrip demand. Although the availability of a better-skilled workforce could in itself stimulate a move to a higher-skilled equilibrium, demand-side policies to support firms – especially SMEs and new innovative ventures – are also required. These may involve programmes to encourage innovation and the adoption of new technologies.

Rethinking lifelong learning is essential in the context of the ongoing changes

The frontloading of skills through initial training for a single lifetime qualification is no longer sufficient or effective and is increasingly being challenged in the context of rapidly changing skill needs. Education and training systems of the future need to be flexible and prepare individuals to learn continuously over their life. Recognising the importance of LLL, the Education 2030 Framework for Action has called on countries to provide 'lifelong learning opportunities for youth and adults that encompass formal, non-formal and informal learning'. Despite this emphasis, implementation

remains uneven between and within countries, especially when it comes to adult learning. The share of adults participating in training ranges from 60% in the United States to just 20% in the Russian Federation. But participation by the low-skilled is only a fraction of this, even in the best performing G20 countries by training provision.

New approaches to education and training are needed

Evolving and fast changing labour markets will impose a massive challenge on traditional education and training systems and will require new approaches to lifelong learning, approaches that introduce integrated models of governance and financing in education and LLL systems and give greater emphasis to local and regional coordination to ensure that employers and individuals are better engaged in education and training.

The actionable principles listed below build on the G20 Skills Strategy (2015a), adopted by G20 Labour and Employment Ministers, which, in turn, drew from the OECD Skills Strategy (2012), and the G20 Training Strategy (ILO, 2011). The purpose of these principles is to:

- Reaffirm the importance of a well-functioning and well-resourced education and lifelong learning system for promoting strong and inclusive growth;
- Underscore the importance of policy coherence through a whole-of-government approach and social dialogue; and
- Identify actions that countries could take to improve the contribution of skills to stronger and more inclusive growth.

Going forward, the design and implementation of skills development and LLL policies governments and social partners should:

- Encourage training provision and participation throughout the lifecycle, particularly by low-skilled workers who might bear the brunt of the consequences of automation and changing skill needs;
- Use financial incentives to encourage training participation and steer training towards the development of in-demand skills;
- Address non-financial barriers to training participation by providing guidance, counselling, childcare and support services and ensure that training provision is flexible enough to overcome time constraints;
- Making the most of the opportunities offered by new technologies in the provision of training, career guidance and advice;
- Certify learning outcomes and validate or recognise informal and non-formal learning to increase the incentives for individuals to invest in training and learn new skills at work;
- Strengthen social protection measures and ALMPs and improve access to LLL opportunities for all, including the disadvantaged groups, to act as a “buffer” and help displaced workers manage their transitions and enterprises adjust to change whilst avoiding high social costs;
- Emphasize the strong role of governments in the development and implementation of LLL, in coordination across policy areas and institutions, and in empowering other stakeholders to encourage access to, participation in and provision of LLL;
- Involve the social partners in national, sectoral and local governance arrangements, the identification of skills needs, the design of education and training curricula, and in the design and administration of financial incentives;
- Monitor and evaluate training programmes to ensure cost-effectiveness and reduce dead-weight loss. Quality assurance also has a key role to play in informing participants’ choice

and rewarding quality provision, particularly in systems with multiple public and private providers.

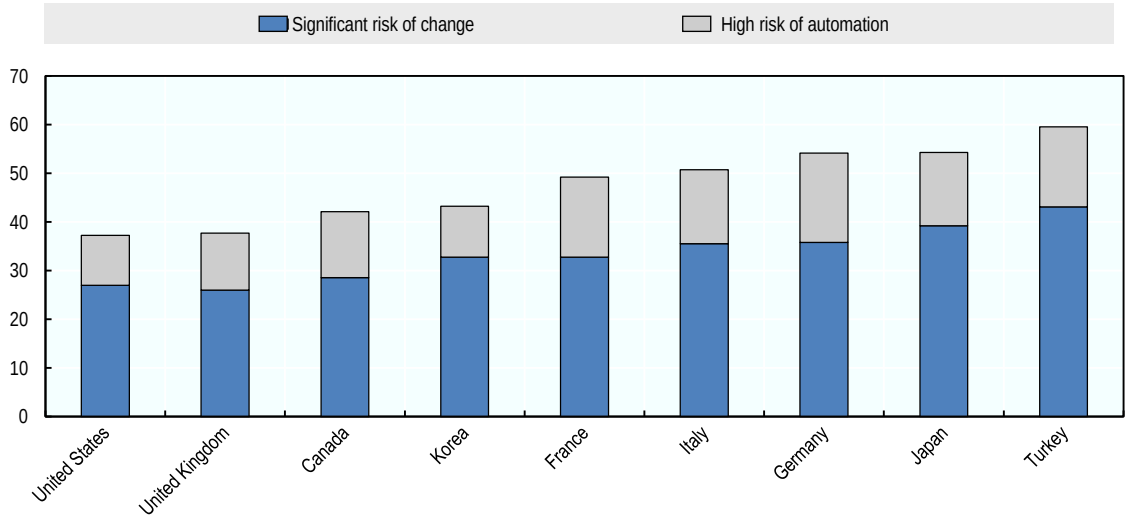
1. Job creation and destruction and changing skills demand

1.1 Global drivers of change and skills implications

Technological, climate, demographic and other changes such as globalisation will have a profound impact on the future of work (ILO, 2018; OECD, 2017a). These changes will affect job availability, the task composition of jobs and skills required in the labour market.

Technological change. Current discussions focus mostly on one aspect of technological development – the role of automation and artificial intelligence (AI) in replacing labour. Estimates of susceptibility of jobs to automation vary widely (e.g. World Bank 2016; Frey and Osborne 2013). Recent OECD estimates based on the analysis of the task content of jobs for some G20 countries suggest that the share of jobs at high risk of automation ranges from 10% in Korea and the United States to 18% in Germany (Nedelkoska and Quintini, 2018) (Figure 1).

Figure 1. Percentage of jobs at high risk of automation and at risk of significant change



Note: Selected G20 countries. Calculations based on the task-content of jobs; Survey of Adult Skills (PIAAC), 2012, 2015.
Source: Nedelkoska and Quintini (2018).

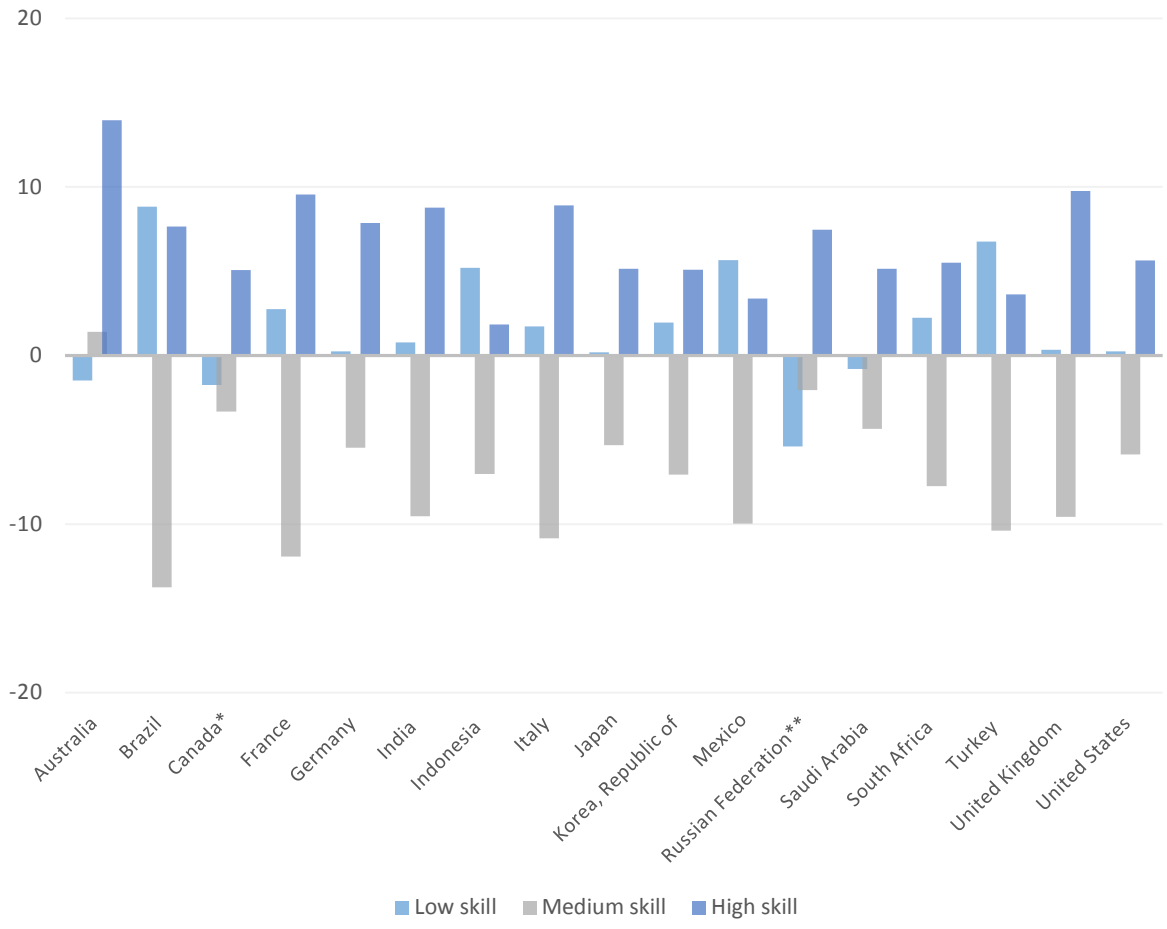
However, these numbers refer to jobs that *could* be automated, rather than jobs that *will* be automated: technological adoption depends on economic, legal, ethical and social considerations, as well as on the availability of the skills needed to work with the new technologies.

Technological change also brings about new opportunities for employment (Nübler, 2016). Digital technologies contribute to workers' productivity and, at the same time, technological progress is creating many new jobs – either directly (for example big data analyst, cloud service specialists or digital marketing specialists) or indirectly through its effect on consumer demand (by lowering prices of goods and services, and increasing their quality). In addition, the same process innovations that displace workers in the user industries create demand for workers in the producer industries (Nübler, 2016). For instance, while the new learning machines may destroy some jobs in manufacturing, they will need be developed, designed, built, maintained and repaired. They will require software and the development of algorithms, and are likely to generate new jobs and occupations in R&D and capital industries (Nübler, 2016).

While automation is unlikely to destroy complete occupations, it will replace some tasks and will fundamentally change the nature of jobs at all levels of education (MGI, 2017, Autor and Handel 2013, Arntz, Gregory and Zierahn 2016). New technologies may result in considerable changes in how these jobs are carried out and the skills required. Thus, the OECD estimates that the share of jobs at risk of considerable change ranges between 26% of jobs in the United Kingdom and up to 43% in Turkey. To ensure that skills development is in line with changes in skill demands, it is important to understand better how jobs will change in terms of the composition of tasks and hence skills requirements. Digitalisation is reducing demand for routine and manual tasks while increasing demand for high-skilled tasks and for problem-solving and interpersonal skills (OECD, 2016). Technological change is likely to require workers in science, technology and innovation (the so-called STEM skills) and workers who can embrace technologies in their work. It will also require business management (strategy, marketing) and design skills to deploy technology projects, and skilled workers to operate and maintain technologies (e.g. solar photovoltaic installers, robot technicians).

Globalisation and trade. Increased trade integration over recent decades has led to outsourcing in advanced economies of labour intensive production tasks and resulted in the relocation of low and middle-skilled jobs to low-wage economies. In most of G20 countries, task relocation coupled with job substitution by technology have contributed to job polarisation whereby the share of employment in high-skilled (and to some extent in low-skilled jobs) has increased, while the share of employment in middle-skilled jobs has decreased (Figure 2).

Figure 2. Change in percentage points in share of total employment by skill level, 1995 and 2015

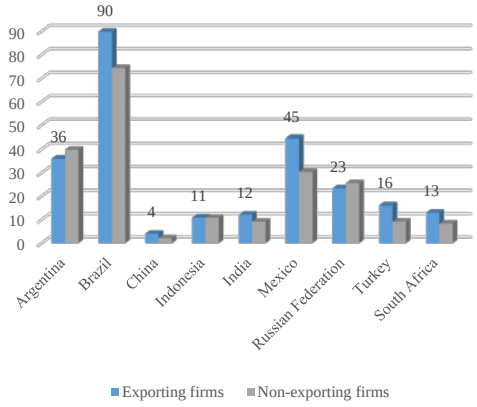


Note: All G20 countries except for Argentina, China and the EU average. ILO modelled estimates are used for India, Indonesia, Japan, Saudi Arabia, South Africa, Turkey and USA. *Data for 2014 was used for Canada 2014 (instead of 2015); **Data for 1997 was used for Russia (instead of 1995). Skills levels classifications are as follows: high – ISCO 1-3; medium – ISCO 4-8; low – ISCO 9.
Source: ILOSTAT

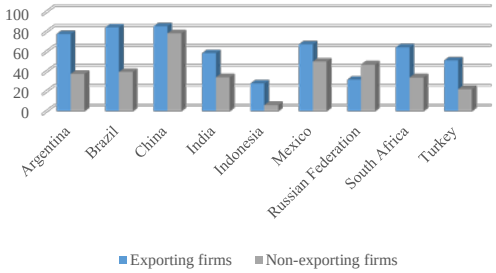
Participation in global value chains has increased the demand for high-level skills which are crucial for countries to specialise in the most technologically advanced manufacturing industries and in complex business services (OECD, 2017b; ILO-WTO, 2017). Notably, export-oriented businesses usually are more aware of skill shortages and invest more heavily in their workforce (Figure 3). For instance, Becker et al. (2013) find that offshoring firms have relatively more domestic jobs involving non-routine and interactive tasks.

Figure 3. Exporting businesses are more aware of skills deficiencies

Percentage of firms identifying an inadequately educated workforce as a major constraint



Percentage of firms offering formal training



Note: Selected G20 countries. Latest available year: Argentina 2017; Brazil 2009; China 2012; Indonesia 2015; Mexico 2010; Russian Federation 2012; Turkey 2013; South Africa 2007.
Source: World Bank Enterprise Survey.

Recent findings point to technology spillover effects that can potentially cause reshoring of some low and middle-skilled production jobs that may potentially become more skill intensive (ILO, 2016a). Reshoring may influence the skills composition in high-income G20 economies, bringing back production jobs and at least partially discontinuing the job polarisation trend if trained workers are available. Reshoring would also affect low-income G20 economies that might have been on the receiving side of low-skilled task offshoring. Finally, lower trade costs may induce skill-biased technological change in both exporting and import competing firms which also contribute to further increased demand for higher-level skills (ILO-WTO, 2017).

Work organisation and new forms of work. Ongoing changes to work organization are being driven by human resource management practices and new business models (e.g. lean and *kaizen*[1]) and emphasize high performance work practices and engagement by workers through mechanisms such

[1]Lean and *Kaizen* are methods of business processes improvement, where the former helps to maximise efficiency and the latter embraces continuous improvement. Modern lean management practices comprise both approaches.

as teamwork, employee's voice, workers' autonomy, multitasking and problem-solving (ILO-WTO, 2017). These management and organisational changes can foster skills use in the workplace but require workers with strong core skills, motivation to learn and, more emphasis on workplace learning (OECD, 2016).

In parallel, recent ILO research identified a growing share of some non-standard forms of employment, such as virtual, platform and gig economy workers, in G20 countries (ILO, 2016). Evidence suggests that firms that rely heavily on non-standard forms of employment tend to underinvest in training, both for temporary and permanent employees, as well as in productivity-enhancing technologies and innovation (ILO, 2016). Similarly, self-employed workers in the platform and gig economy tend to have limited access to training opportunities. Financial and non-financial incentives for increasing access to training for both employers and workers in all types of employment will become more important in the future (see Section 3.2).

Climate change and environmental degradation. The transition toward a more sustainable pattern of economic growth will generate new jobs, cause some job losses and alter the skills composition of many jobs. The skills of business and government leaders will need to embrace the knowledge on climate change and environment to drive the green transition. New consumption and production patterns, resource efficiency and emission targets will influence workforce tasks and skills across the board and require new hybrid skills, such as green plumber or green electrician (Strietska et al., 2011). The ILO estimates that the net employment effect from transition to a low-carbon economy will be positive, with around 18 million new jobs expected by 2030 created globally as a result of the decarbonisation of energy use and energy efficiency measures alone (ILO, 2018 forthcoming). Recycling, repair, remanufacturing, and sustainable agriculture also will generate many jobs. However, some job losses are inevitable in the extraction industry and high carbon-emitting manufacturing. Skills development and active labour market policies (ALMPs) in this context will become central in both supporting displaced workers and promoting the green transition.

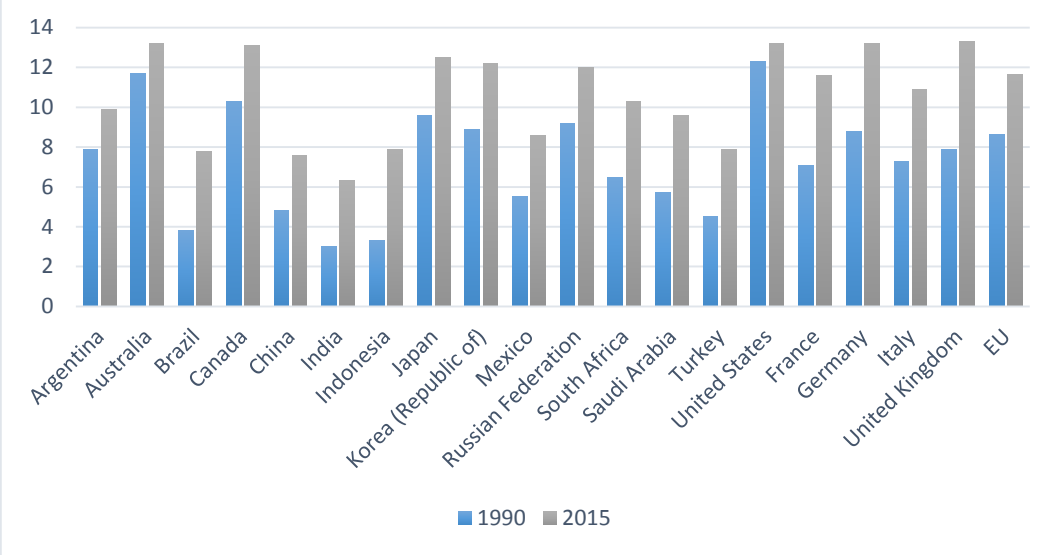
Demographic changes. Skills supply is tightly linked to labour supply and demographic trends. Aging has been a prevailing trend in many G20 economies and, according to the ILO and OECD estimates, between 2020 and 2030 it will translate into a shrinking labour force in China, France, Germany, Italy, Japan, Korea, Spain and Russia. The BCG forecast of labour supply and demand predicts skilled labour shortages in G20 countries with the exception of the US and South Africa (BCG, 2014). Aging is expected to sustain the growing demand for care workers, contributing also to the further "marketization" of previously unpaid domestic work (MGI, 2017). Training measures to support workers' retention, activation and productivity may help to at least partially resolve labour and skill shortages in the longer term. At the same time, strong youth cohorts in Australia, Brazil, India, Indonesia, Mexico, Saudi Arabia, South Africa and Turkey represent a challenge to youth employment. Turning the demographic dividend into skilled workforce for attracting investments and creating jobs will be crucial in these countries.

Labour mobility. Migration is one of possible solution to shortages of skilled labour. Well-governed labour migration can balance labour supply and demand, help develop and transfer skills at all levels, and contribute to sustainable development for countries of origin, transit and destination (ILC, 2017). G20 countries host half of the world's international migrants and have witnessed a significant rise in immigration in the past decade, including intra-G20 migration, with a substantial labour migration share (OECD, ILO, WB, IMF 2016). Further increases in workers' mobility and redistribution of labour with various levels of skills across the globe can be expected in the future. Recent ILO analysis of qualification mismatch among immigrants in comparison to native workers in European countries highlighted the vulnerable position immigrants typically have in labour markets

(Sparreboom and Tarvid 2017). High levels of over-qualification among migrants are partly the result of a lack of recognition of their actual skills. Thus, improving systems of validation and recognition of prior learning in G20 countries could avoid the risk of "brain waste" and underemployment, and help guide migrants to jobs for which their skills are well-matched.

Improved levels of educational attainment. Enrolment and participation in education and training has been growing steadily across G20 countries resulting in a better educated workforce. On average in G20 countries, mean years of schooling increased by 3,5 years since early 1990 (UNDP estimates). However, the highly positive dynamics is accompanied by large variation across G20 countries (achieving 6 mean years of schooling in India as compared to 13+ years in several high-income countries). The progress in schooling among girls has been impressive achieving higher rates as compared to boys in many G20 countries but variation among countries in closing the gender gap is also large: for instance, while girls in India enjoy only around half of schooling years of boys, in Canada girls enjoy almost one year of schooling longer that boys. Despite this progress, greater access to schooling and more years of education do not translate into increased proficiency in foundation skills, such as literacy and numeracy. According to the Survey of Adult Skills (PIAAC), secondary school students in some countries have the same levels of proficiency in literacy and numeracy as university graduates in others (OECD, 2015b). Foundational skills are key for the potential adaptability and employability of workers in the fast changing labour markets. Thus it is important to invest in quality education, not just in more education (OECD, 2015b).

Figure 4. Mean years of schooling in G20 countries 1990-2015



Note: All G20 countries. UNDP estimates.
Source: Human Development Data (1990-2015).

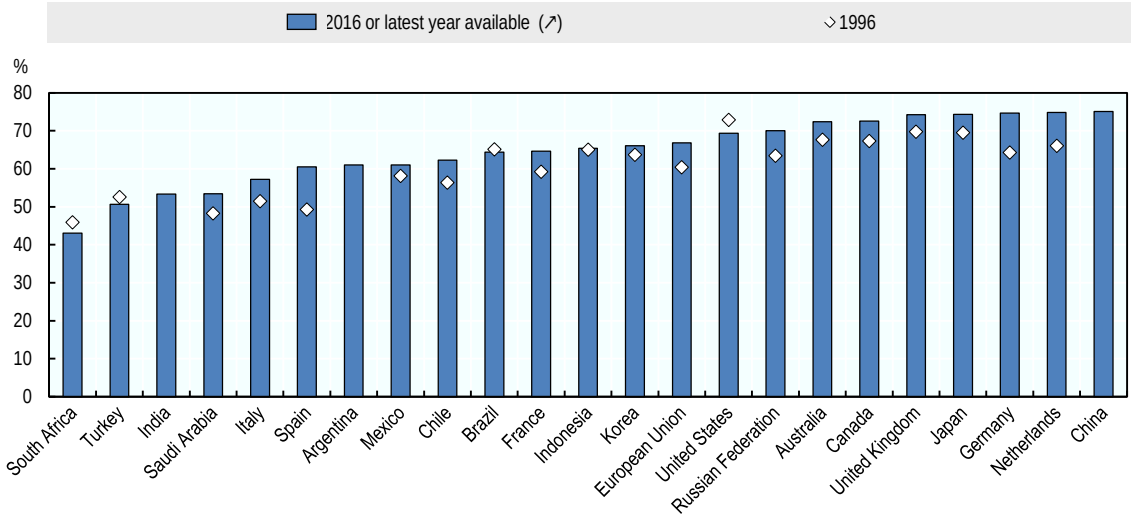
At the same time, the rapid increase in educational attainment has been accompanied, in some countries, by over-qualification – whereby workers possess a higher level of education than the one required by their job – which could potentially crowd the low-skilled out of the labour market, putting them at significant disadvantage. A recent ILO study found that over-qualification is an issue in both developing and advanced economies, and that around one in four workers are employed below their qualification level (ILO, 2018a forthcoming). Only part of this mismatch may be due to structural issues or competency gaps. In some cases, heterogeneity in the quality of education and training systems translates into some graduates having a lower level of skills than what would be expected of their qualification. In these cases, overqualified individuals may possess the right level of skills required in their jobs.. In others, the economy has not developed fast enough to absorb better

educated workers, causing mismatch between the supply and demand of highly-qualified workers. That is why supply-side actions need to be accompanied by demand-side measures to boost aggregate demand and improve job quality to attract educated workers and fully utilise human capital.

1.2 Recent trends, outlook and skills challenges

To date, rapid technological change and globalisation have not led to reductions in employment overall. Indeed employment rates have risen in most G20 countries between 1996 and 2016 suggesting that globalisation and technological change, while affecting jobs in certain sectors and occupations have also generated many jobs elsewhere (Figure 5).

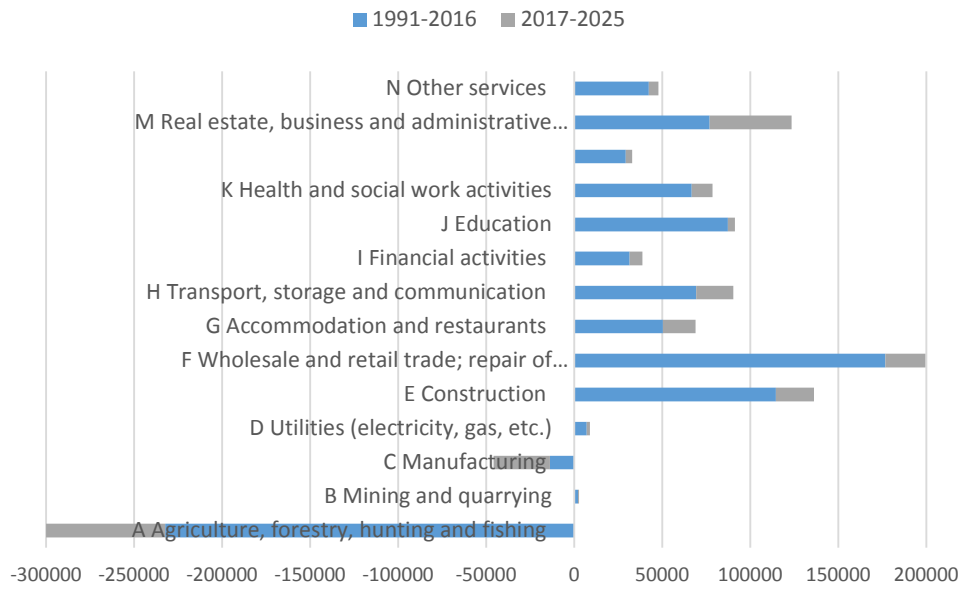
Figure 5. Employment-to-population ratios, age 15-64, 1996[a] and 2016 or latest year available[b]



Note: No data available in 1996 for Argentina, China, India, Indonesia and South Africa.
a) First semester 1999 for Saudi Arabia and 2000 for Indonesia and South Africa.
b) Q2 2016 for Argentina and Saudia Arabia; 2015 for Brazil; 2010 for China; and 2011/12 for India.
Source: OECD Employment Database, http://www.oecd.org/employment/emp/onlineoecdemploymentdatabase.htm for Australia, Brazil, Canada, Chile, China, the European Union, France, Germany, India, Italy, Japan, Korea, Mexico, the Netherlands, the Russian Federation, South Africa, Spain, Turkey, the United Kingdom and the United States. OECD estimates based on microdata of the Encuesta Permanente de Hogares (EPH) for Argentina, ILOstat for Indonesia, and Labour Force Survey results published by the General Authority for Statistics for Saudi Arabia.

Cumulatively for G20, the number of jobs has risen in sectors such as wholesale, construction, transport, real estate, education, health and other services and this trend is expected to continue while the number of jobs in agriculture and manufacturing is expected to continue shrinking (Figure 6, based on the ILO modelled estimates). However, Argentina, Brazil, India, Indonesia, Turkey and Mexico will continue enjoying positive employment growth in both industry and services.

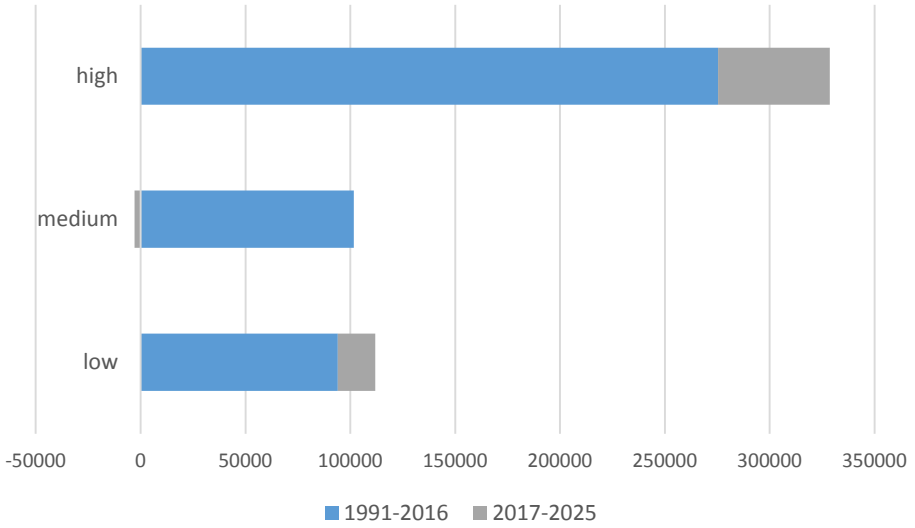
Figure 6. Employment change by economic activity between 1991 and 2016 and an outlook until 2025



Note: All G20; in thousands.
Source: ILOSTAT, ILO modelled estimates

In most G20 countries, employment growth was experienced at all skill levels but fastest for jobs requiring high-level skills. Based on ILO estimates for all G20 countries cumulatively, this upward trend, with some variations between countries, is expected to continue for high-skilled occupations and, to a lesser extent, for low-skilled jobs, following the same job-polarisation pattern presented above.

Figure 7: Employment change by skill level between 1991 and 2016 and projected until 2025



Note: All G20 countries; in thousand.
Source: ILOSTAT, ILO modelled estimates.

While the process of job creation and destruction has resulted in an overall increase in employment on average, the differences between the types of jobs lost and those created are such that many displaced workers require significant training and re-employment support. This need may become even greater in the future if skill needs change more dramatically than in the past as a result of the confluence of megatrends (digitalisation, globalisation, climate change mitigation, demographic change) affecting all G20 economies. ALMPs and effective labour market institutions can support the quick reemployment of workers who lose their jobs to avoid rising unemployment, depressed wages and rising income inequality (MGI, 2017). To this end, lifelong learning mechanisms that incentivise learning uptake to upgrade skills as well as to retrain for new occupations at any point of worker's career and lifetime will have to be combined with social protection mechanisms to allow for work interruption and sustained income.

2. The skills challenge

The job creation and destruction dynamics described above suggest large-scale changes in the nature of work. This puts a premium on a set of meta-skills, such as agility, flexibility, grit, and learning how to learn. (MGI, 2017). Along with technical skills, core skills, such as problem solving, team work, leadership, initiative etc., become an employment security mechanism that allows smooth transitions between jobs, occupations and sectors. The OECD Skills Outlook 2017 highlights the growing importance of skill mixes, in the context of the transition to a digital world of work (OECD, 2017b). The right skill mix would include strong general cognitive skills, like literacy and numeracy, which can provide a solid foundation to pursue lifelong learning. It also includes basic ICT skills, analytical skills and a range of complementary skills like creativity, problem-solving, and critical thinking. Interpersonal and communication skills, as well as emotional skills like self-awareness and the ability to manage stress and change, are also increasingly important.

These emerging skill needs are already generating skills mismatch and shortages in several G20 countries, pointing to where action in skills development or in supporting the demand for high-level skills might be needed.

2.1 Some evidence on qualification mismatch

The OECD Skills for Jobs database[2] identifies current skills imbalances in several countries, including several G20 economies. On average, in G20 countries for which data are available, 43% of workers are either over- or under-qualified relative to the qualification level that is required in their job. Over a third of workers work outside their field of study, although data for this type of mismatch is only available for few G20 members (Figure 8).

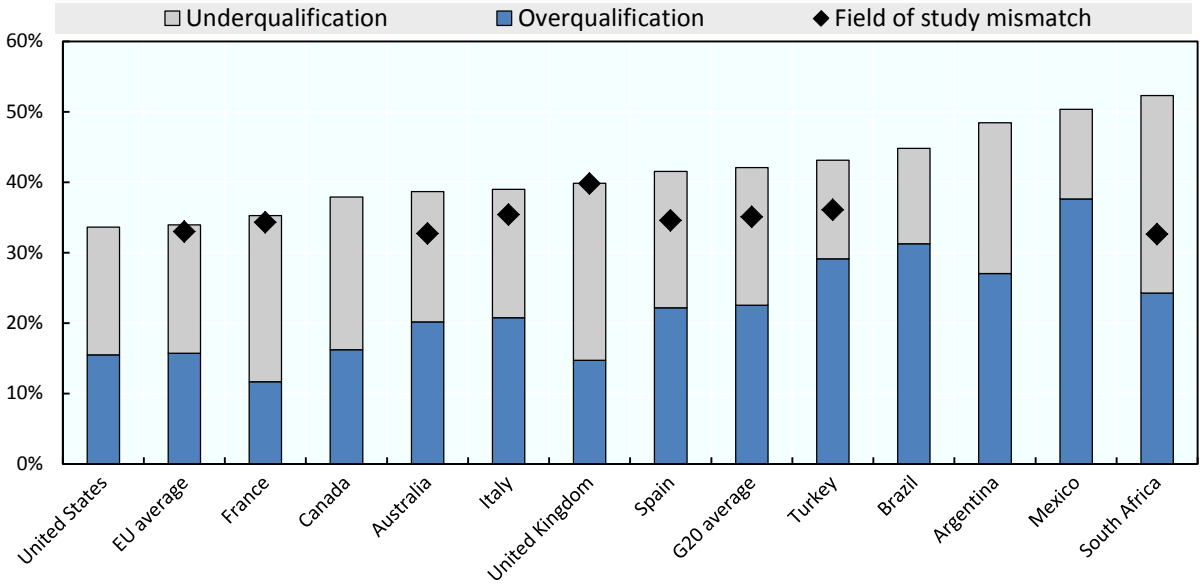
The overall incidence and nature of mismatch varies significantly across countries. Qualification mismatch is more pronounced in Argentina, Mexico, South Africa and Turkey. With the exception of South Africa, these are also countries where over-qualification tends to dominate under-

[2] The OECD Skills for Jobs Database provides timely information about skills shortages and surpluses, as well as data on qualification and field-of-study mismatch. The database provides information on a wide range of skills, including cognitive skill, social skills, physical skills and a set of knowledge types. The indicators are built on indices of wage growth, employment growth, hours worked growth, unemployment rate and under-qualification growth. The current version of the database covers European countries and South Africa. A new release in July 2018 will include data for Argentina, Australia, Brazil, Canada, Chile, Mexico, New Zealand, Peru and the United States. Data at the sub-national level is available for some countries along information presented by industrial sector (OECD 2017c).

qualification, suggesting that the increase in educational attainment might not have been met with adequate demand for a better-skilled workforce. Conversely, the US is the country with the lowest incidence of qualification mismatch and a fairly balanced distribution between under- and over-qualification. Under-qualification is markedly more widespread than over-qualification in France and the United Kingdom, where skills upgrading may not have kept pace with the changes in skill demand.

It is also important to note that, to some extent, over-qualification may also reflect poor quality of the education system which is not equipping graduates with the skills required in graduate-level jobs. This is confirmed by evidence that workers who possess higher *qualifications* than required by their job do not always have *skills* in excess of job requirements. Evidence on the dispersion of skill levels among workers with the same qualification attainment also goes to support this view.

Figure 8. Qualification and field-of-study mismatch in G20 countries



Note: Percentage of workers in each category of mismatch, 2016 or most recent year available.
Source: OECD Skills for Jobs database.

2.2 Key technical and core work skills needed to stimulate the growth of decent jobs and fuel innovation

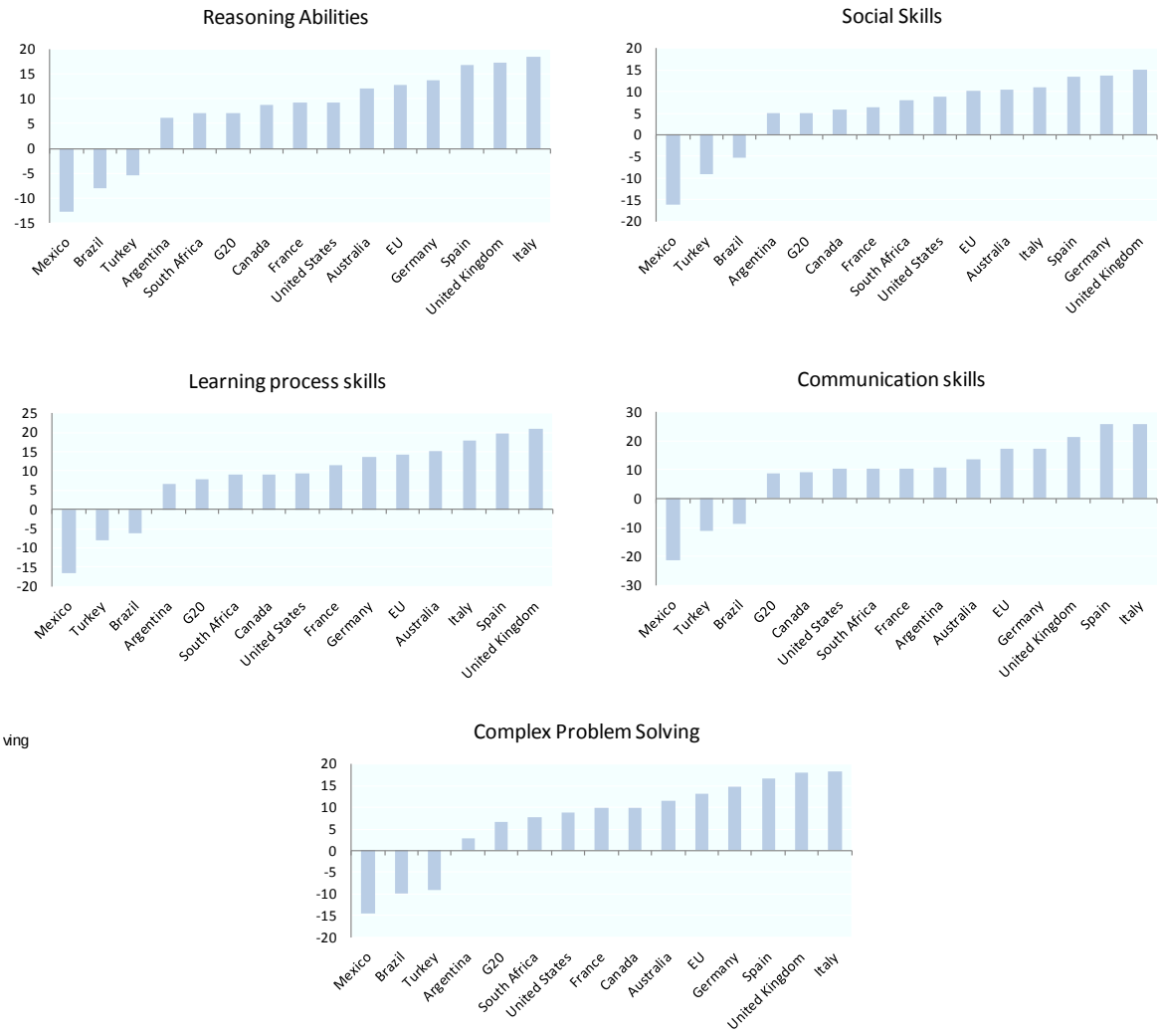
Information on skills imbalances derived from the OECD Skills for Jobs database suggests that skill priorities may vary significantly across countries.

A number of G20 countries are indeed experiencing skills shortages in high-level cognitive and social skills, suggesting that the demand for these high-level skills is rising faster than the supply (Figure 9.). The most critical shortages are observed in Italy, Spain and the United Kingdom and the most modest in Argentina and South Africa. However, shortages are not observed across the board: some economies appear to be still stuck in a low-skilled equilibrium. This is the case for Brazil, Mexico and Turkey where supply outstrips demand in reasoning, problem solving, learning process skills as well as social and communication skills.

A consistent picture emerges when focusing on knowledge areas related to science and technology advances (10). As digital technologies have become more pervasive, the demand for relevant skills has risen. Not only does this include the technical and vocational skills needed to design, operate and maintain digital infrastructure – e.g. computer and electronics knowledge – but also the ICT

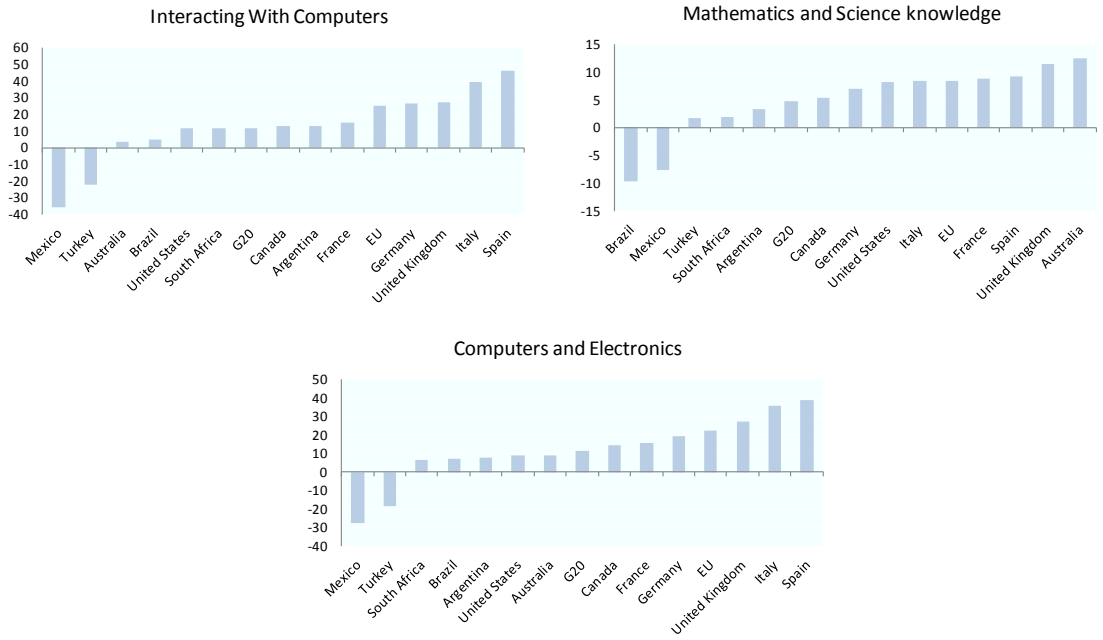
generic skills for workers to be able to use digital technologies – e.g. the ability to interact with computers. This is the case in most, but not all, G20 countries for which data is available. Similarly to the results for transversal skills, science and technology related knowledge is not (or is but just) in shortage in Brazil, Mexico and Turkey. This suggests that automation may be a more imminent risk for some G20 countries than others.

Figure 9. Rising demand for high-level cognitive and social skills



Note: Index of shortage (+) or surplus (-) in each skill. Negative values represent surpluses and positive values represented shortages in each skill domain.
Source: OECD Skills for Jobs database.

Figure 10. Emerging shortages in skills needed for the digital economy



Note: Index of shortage (+) or surplus (-) in each skill. Negative values represent surpluses and positive values represented shortages in each skill domain.

Source: OECD Skills for Jobs database.

These findings highlight how the widespread discourse of rising skill requirements coupled with automation destroying jobs may still be a distant prospect for a number of the G20 emerging economies where a relatively low-skilled workforce is matched by the limited demand for STEM and high-level cognitive skills. Although the availability of a better-skilled workforce could in itself stimulate a move to a higher-skilled equilibrium, demand-side policies to support firms – especially SMEs – are also required. These may involve programmes to encourage innovation and the adoption of new technologies and improved work organization.

On the other hand, for a number of G20 economies, particularly the advanced economies, the knowledge-based economy is already a reality with the demand for high-cognitive skills outstripping supply to generate shortages for a number of transversal skills and knowledge areas. For these countries, a response is required on two fronts. In terms of initial education, skills imbalances should inform changes in teaching methods and curriculum content to ensure that high-level problem solving, critical thinking, and the ability to manage complex social interactions are developed. Existing skills imbalances also raise opportunities and challenges for those who have already entered the workforce. As jobs undergo significant changes from automation, workers will need to retrain, either to perform new tasks in their existing job or to find employment in new, emerging sectors. Rebalancing educational investments over the life-course can help make education and training systems more flexible and demand-sensitive to emerging skill needs.

3. Rethinking lifelong learning for the future of work

3.1 Revisiting the concept of lifelong learning

Whilst the concept of Lifelong Learning (LLL) was developed by UNESCO and the OECD in the 1970s, it returned to the skills policy agenda in the 1990s when governments recognised the 'front-end' model of education and training was increasingly unsuited to modern economies. Whilst the value of initial training should not be discounted, the frontloading of skills through initial training for a single

lifetime qualification is not sufficient or effective and education and training systems of the future need to be flexible and prepare individuals to learn continuously over their life (ILO, 2018).

The concept of LLL has evolved to be understood today as covering all education and training during a lifetime, including both initial education and training and adult learning. It is considered 'lifelong' but also 'lifewide', covering learning in institutions, families, communities and workplaces, and 'life-deep', assuming active assimilation and mobilisation of knowledge (Bélanger, 2016). The G20 Training Strategy and the G20 Skills Strategy acknowledge that a life cycle perspective on skills development involves an ongoing process of building, maintaining and improving skills throughout life. They also recognised that skills build upon one another and that foundation skills such as literacy and numeracy, and the ability to 'learn to learn' are essential for the acquisition of further skills and competencies later in life (ILO, 2011; OECD, 2015a). Thus as labour markets and the demand for skills evolves, a comprehensive people-centred and rights-based approach to LLL should help workers adjust to change, preventing the high social costs of the complex and disruptive changes that lie ahead and maximising their positive effects. Therefore, concrete steps towards achieving a right for all to access formal and non-formal learning throughout their lives should be put on the agenda (UN 1999).

However it is worth recognising that LLL remains a contested concept. According to Bengtsson, the concept of LLL remains vague and without a coherent implementation strategy (Bengtsson, 2013). LLL is also perceived by some as a 'Nordic' and 'Western' concept imposed on the South which has a stronger tradition of 'adult education' (Torres 2004). Other critiques see LLL as enabling the state to withdraw from the education process, and the field of adult education in particular, shifting responsibility to individuals (Lovren & Popovic, 2018).

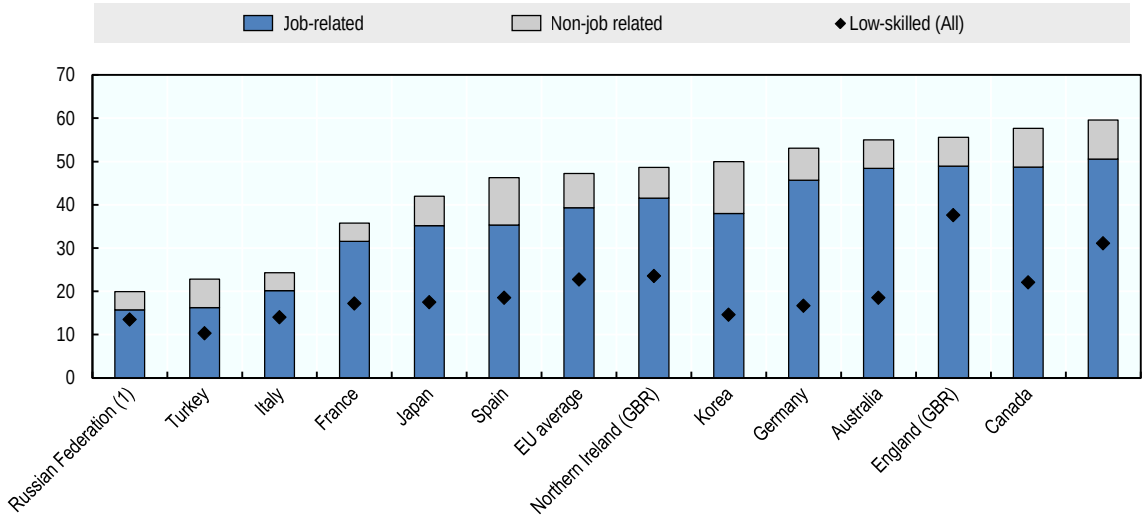
Recognising the importance of LLL, the Education 2030 Framework for Action has called on countries to provide 'lifelong learning opportunities for youth and adults that encompass formal, non-formal and informal learning'. (UNESCO, 2016). The 2030 Agenda for Sustainable Development has recognised these different forms of skills development and highlighted the importance of adult learning and education as an actionable agenda to implement lifelong learning (UNESCO, 2016).

However, across the board, implementation of LLL is considered weak, uneven and often without strong commitment (Bengtsson, 2013). Evidence suggests for example, that the financing of adult learning and education (ALE) remains low, with 42% of countries spending less than 1% of their public education budgets on ALE (UNESCO, 2016).

As a result of the unbalanced investment across different LLL sub-systems, although people have become more highly educated in recent decades, returns in terms of improved skills proficiency have been lower than expected. Longitudinal data on skill levels is sparse and not fully comparable, but evidence on literacy from the comparison of the International Adult Learning Survey (IALS) between 1994 and 1998 and the 2012 PIAAC Survey of Adult Skills suggests stable to modest declines in skill levels in the G20 countries covered by both surveys (OECD, 2015b). This disconnect between the gradual expansion of educational attainment and the lower than expected improvement to skills proficiency suggests that raising the educational attainment of the population alone is not enough and that more emphasis must be put on improving the quality of education and training systems, as well as maintaining and updating skills among adults to avoid skills obsolescence and depreciation.

Despite its importance, adult learning participation remains limited in many G20 countries, particularly for the low-skilled (Figure 11). Other groups under-represented in training include workers in SMEs and own account workers (notably self-employed workers without employees).

Figure 11. Incidence of training among adults, by skill level



Note: Percentage of adults who participated in adult education and training during year prior to the survey. EU average refers to the unweighted average of training incidence in the 19 EU countries covered by the Survey of Adult Skills PIAAC.
Source: Survey of Adult Skills (PIAAC), 2012, 2015.

Access to workplace training remains highly dependent on the type of employment contract in place with almost 50% of employees on permanent contracts in the EC receiving training compared to 32% of employees with fixed contracts and 19% of self-employed (EC, 2016). This illustrates the fact that those who need lifelong training the most are often those who have the least access to it.

Thus, a paradigm shift is still needed: countries can no longer rely solely on formal education to help individuals develop the right mix of skills for success in work and life because a lifelong effort is needed to continuously raise the skills of the working population.

In this context, Adult Learning and Education (ALE), Work Based Learning (WBL) and ALMPs have a crucial role to play in providing non-formal and informal learning, elements of LLL systems which are relatively underdeveloped compared with formal education and training.

3.2 Financial and non-financial incentives targeting individuals and employers for training provision and participation in training

Given the need to increase the participation of certain groups in education and training including adults, the self-employed, women and youth, financing mechanisms are increasingly seen as an important policy tool to drive participation as well as improve the alignment between skills demand and supply.

The literature indicates trends towards greater diversification of funding sources (including cost sharing and training levies), budgeting public training centres through objective funding formulas, encouraging more and higher quality enterprise training, developing private training markets, increasing competition between public and private training providers and establishing independent national training funds (Ziderman, 2016). The excessive reliance on private training markets is not without risk however with greater attention required to quality assurance and the regulation of private providers.

While publicly financed education is mainly directed towards children and young adults not yet in employment, it also needs to focus on workers and jobseekers to improve their employability.

Many G20 governments have been using financial incentives (such as subsidies, tax incentives and subsidised loans) to encourage individuals and employers to invest in more education and training.

However, they can also be used to steer the provision and acquisition of education and training towards areas of skills shortage.

A recent study by OECD (OECD, 2017d) observes that financial incentives are already used to a greater extent in non-EU countries like Australia, Canada and the United States, where governments are more reliant on the market to deliver education and training outcomes. If more countries move to rely on market mechanisms for allocating resources, it is likely that financial incentives will become increasingly important.

Financial incentives for steering education and training decisions can be targeted at institutions, individuals, or employers, but the choice of which group to focus on requires a careful diagnosis of the problem.

Financial incentives for institutions

As the provision of education and training is heavily subsidised in most G20 countries, funding agreements for education and training institutions are commonly used to steer the mix of provision in favour of subjects in demand or of strategic importance. Examples include:

- Governments targeting public subsidies at particular courses only, such as the case to encourage participation in STEM fields;
- Governments varying public subsidies by field of study. In Australia, for example, states such as Queensland have used variations in subsidy rates for TVET provision as a way to steer market forces in strategic directions. "Priority One" qualifications are those which lead to occupations deemed to be critical priorities, and the cost of training for apprentices and trainees in these qualifications is 100% subsidised. By contrast, "Priority Two" (not deemed critical but considered as high priorities) and "Priority Three" (not deemed critical but considered as medium priorities) are 87.5% and 75% subsidised, respectively.

In many countries, arbitrary and ad hoc institutional core funding arrangements are in place for public education and training institutions. Reforms that encourage improved performance include moves towards objective funding formula based on different criteria (including inputs, outputs, labour market outcomes and quality requirements) and the use of service contracts and in some cases competitive bidding processes (Ziderman, 2016). These changes to funding models for public training institutions help provide an appropriate mix of regulation and incentives to ensure they can effectively participate in more competitive training markets likely to emerge as lifelong learning systems become more established.

Financial incentives for individuals

Financial incentives can also be used to steer individuals to acquire certain types of skills. Common approaches include scholarships, grants, bursaries, allowances, vouchers, training cheques and credits. These are the most direct and flexible financial incentives for steering education and training decisions and can be targeted at various groups:

- Students participating in initial education: many countries have scholarship programmes that provide incentives for students to take up certain courses. A large number of these programmes also focus on STEM courses but also target subjects for which there is unmet labour market demand.
- The employed: subsidies for training existing employees are most often paid directly to employers since they are best placed to understand their skills needs. However, certain "retention and advancement" programmes target low-skilled workers who are less likely to benefit from employer-sponsored training, and aim to increase their chances of retaining their existing job and/or moving to a higher quality one. In Germany, for example, workers without qualifications and workers who have spent at least four years in a job unrelated to their initial

training may receive funds from the government to retrain in an area with good labour market prospects.

- The unemployed/inactive: labour market training plays a critical role in matching labour demand and supply by ensuring that the unemployed/inactive are given the skills that are needed by employers.

Individual time/savings/learning accounts are another instrument for governments to encourage training participation. These allow individuals to save up time or money which they can subsequently use for training purposes. In some cases, countries have built in mechanisms to steer training choices towards skills in high demand (OECD, 2017c). In France, time saved through the Compte Personnel de Formation (Individual Training Account) can be used to take up a list of training courses selected by the Regional Councils, the social partners and the professional associations, which often reflect foreseeable economic needs. The successful Scottish individual learning account ILA 200 scheme is directed towards low income individuals and provides up to £200 annually towards tuition fees for a wide range of courses that need not lead to a formal qualification (Ziderman, 2016).

Financial incentives for employers

Whilst employer participation in training is affected by various factors including firm size, information asymmetries, liquidity constraints and the risk of poaching, one of the major reasons governments intervene in conventional training markets is to encourage formal sector enterprises to provide more and better training.

The vast majority of incentives for steering the training decisions of employers come in the form of direct subsidies. Whilst many of these support apprenticeships as an important element of initial education and training, many remain general and do not target specific skills, instead allowing for flexibility in the identification of training needs, both on the part of employers and on the part of government. A common example are subsidies that target specific sectors (rather than skills), which is often done with a number of different objectives in mind such as supporting structural change, overcoming specific training barriers or supporting strategic sectors with growth potential. In Japan, for example, the Career Keisei Sokushin Joseikin programme is a general training programme targeted at existing employees, but greater subsidies are provided in priority areas, including: health, social work, ICTs, and environment-related construction and manufacturing (OECD, 2017c).

Whilst governments may subsidise enterprise training directly from central government budget appropriations, they also rely on specially designated training funds linked to enterprise levy-grant schemes. While many variants are found in terms of actual practice, a common feature of levy-grant schemes is the use of payroll or other levies to accumulate funds that are then used as incentives for firms to invest in more and better in-service training. Training levies can also be sector specific and may be based as appropriate on the value of turnover, output, value of contracts or employment rather than only company payrolls. National levy grant schemes are in place worldwide and can be found in a range of G20 countries, including Argentina, Australia, Brazil, France, South Africa and the UK (Ziderman, 2016). In South Africa, a common 1% payroll levy is in place but allocation and management of levy proceeds is controlled by tripartite Sector Education and Training Authorities (SETAs). In Brazil, the system puts the private sector in the driving seat when it comes to decision making regarding the fund allocations, and this feature makes the system more responsive to labour market needs as compared to other levy-grant systems in Latin American countries. Levy schemes however do have limitations and some have been criticised for not providing employers with sufficient control over expenditure and for their limited success in engaging SMEs (Ziderman, 2016).

Given the expected increase in the use of casual workers and sub-contractors along with the associated reduction in training offered to employees, it is likely that the growth of training levies will not diminish as governments continue to look to further encourage employer contributions to the cost of training skilled workers.

Non-financial incentives

Financial incentives are likely to address only some of the barriers that prevent individuals and employers from participating in skills development. Other factors such as the availability of career guidance, counselling and care and support services as well as the involvement of intermediary organisations have been found to play a crucial role. For example, establishing childcare facilities for the children of staff and students of education and training institutions have been found to make a significant difference in female participation in TVET such as at the Fife Women's Technology Centre in Scotland (UNESCO, 2015).

ILO and OECD research on apprenticeships also suggests that non-financial incentives can enhance the training capacity of firms by providing training for apprentice instructors, offering training support materials to firms and facilitating networking among employers, as was the case in the Australian construction sector (OECD and ILO, 2017a).

Effective leadership is also an important non-financial incentive for firms and individuals to invest in training. ILO and OECD research on skills utilisation found that the most successful changes that occur at the enterprise level are often industry-led, particularly by employer groups, chambers of commerce or workers and their representatives. Effective leadership from employer and worker representative bodies can ensure that workforce development activities are systematically embedded across an entire industry rather than a single employer (OECD and ILO, 2017b).

It is also apparent that the specific needs of SMEs often require specialised and targeted support to ensure they can benefit from skills development opportunities and establish partnerships to share innovations and new technologies that encourage investment in skills. This includes the use of supply chain management practices to support SMEs in developing workforce innovation programmes that invest in the skills of workers, as was the case with the LBJCP and CHAMP programmes in Korea (OECD and ILO, 2017b).

3.3 Lifelong learning strategies and good practices for specific target groups

Older Workers

Regardless of the differences in content, quality and amount of training offered to older people across different employment sectors, older workers are less likely to have access to skills development than younger workers and are less likely to engage with learning if the opportunities are available to them (Meyers et al., 2010). This is the case because either the returns are too low given their remaining working careers or because the type of training delivery (e.g. in a classroom) is not attractive (OECD 2006). Ensuring the participation of mature age workers in training may be best addressed by continuing to provide them with opportunities for rich work and further development to sustain their capacities and interest in contributing to their work and workplaces as well as ensuring that they have good training opportunities earlier on in their careers. (Dymock et al., 2012)

Low-skilled, own-account workers and SMEs

Workers in SMEs and own account workers such as the self-employed, are under-represented in training. Increased participation can be achieved by re-designing tax systems to encourage adult learning and by providing financial support to alleviate the costs of learning. It could also mean improving systems for career guidance and opportunities for the recognition of skills acquired through informal and non-formal learning. For small firms, targeted initiatives to encourage skill needs assessment and training provision are also important measures to reach low skilled and own account workers.

In most OECD countries, low-skilled adults are less likely to participate in training activities, and employers and workers representatives have a key role to play in mobilising them. The *Union Learning Fund* in the UK offers training programmes which mainly target low-skilled workers. The

fund is organised by trade unions, which subsidise learning activities that they identify as important for their members, in consultation with employers, employees and learning providers. Union learning representatives engage directly with low-skilled workers to recruit their participation, and as a result, participants are disproportionately older workers with no formal prior qualifications. Low-skilled learners achieve the most significant outcomes, with over two-thirds of learners with no previous qualification moving to a higher qualification level (Stuart et al., 2016).

The validation or recognition of non-formal and informal learning improves skill matching in the labour market by strengthening the signalling power of skills and making it easier for employers to identify which skills jobseekers already have. It also provides an incentive for individuals to further invest in learning by allowing them to capitalise on the skills they already have. This process of Recognition of Prior Learning (RPL) is particularly important in countries with high levels of under-qualification where workers possess skills required for the job but lack a qualification to prove this. The RPL system in France is particularly well-developed (*Validation des Acquis de l'Expérience*, VAE) and allows participants to demonstrate the skills they have acquired through work experience in a jury evaluation, with those who are successful at demonstrating mastery of required skills able to obtain a partial or full recognition of a given qualification.

Youth

The ILO's 2017 youth and future of work survey found that young workers are aware of the need for training as jobs change due to the impact of technology (ILO, 2017). However as much of the responsibility for equipping youth with relevant skills lies with national education and training systems, these systems will need to strengthen the programmes and services offered to ensure that initial education and training provides relevant and high quality skills to smooth the school to work transition of young people. This engagement should also be broadened to offer interdisciplinary training that allows students to develop core work skills and knowledge through experiential learning, such as through quality apprenticeships and other forms of work-based learning. Programmes will increasingly need to cover a range of subjects beyond narrow occupational classifications to deliver more fluid trans-disciplinary skill sets such as those defined as 21st-century skills (Brewer and Comyn, 2015). However, research by the ILO and UNESCO suggest that many TVET and skills systems may not as yet sufficiently support the development of these generic or so-called 'soft skills' (UNESCO, 2015; ILO, 2015). This reinforces the need to ensure that initial education and training for young people delivers relevant skills to a high standard.

The employment outcomes and earnings of young people can also be improved through ALMPs and social protection measures, with support of employment services, through skills training and entrepreneurship promotion as well as subsidised employment, including public employment programmes and wage subsidies. Different ALMPs can be combined to address diverse labour market disadvantages for young men and women and are increasingly being used to promote the formalisation of employment amongst youth (ILO, 2017).

3.4 Institutional mechanisms for coordination and social dialogue on skills

If the concept of LLL is to be operationalised more fully, models of governance and financing will need to be revised so they are more suitable to the increasingly integrated and complex skills systems that will evolve. It will also demand more flexible education and labour arrangements so that individuals can access and engage in learning opportunities more easily and frequently than is currently the case. These include modularised courses and flexible delivery methodologies, including blended learning, that improve opportunities to access learning.

In response to the demand for higher level skills, there has been a diversification of the providers of post-compulsory education and training. A wider range of public and private education and training providers now offer more diverse and flexible courses catering to a more diverse population of learners. This has created more diverse pathways to and from tertiary education and training and it

is expected that this trend will continue and intensify in the future (UNESCO, 2015). In this context, innovative public-private partnerships between schools, universities and private training providers should be further encouraged to invest in skills development of a more fluid and highly mobile workforce (EC, 2016).

As noted by both the G20 Training Strategy and the G20 Skills Strategy, one of the main challenges of public policy is to foster institutional arrangements through which government departments, employers, workers and education and training institutions can respond effectively to changing skill needs and play a strategic and forward-looking role in coordinating the education and training system (ILO, 2011; OECD, 2015a). One way of achieving this is for policymakers at the local, regional and national levels to articulate skills use as a strategic policy priority and consider what types of incentives are required to better engage employers in thinking about how they could more effectively use the skills of their employees (OECD and ILO, 2017b).

However, promoting the increased use of skills in the workplace (better skills utilisation) requires a policy shift away from the supply side of skills systems. ILO and OECD research on skills utilisation found that integrated approaches which consider training, employment and economic development priorities together can help improve the business case for investing in the skills potential of workers. This requires a move away from policy silos at the local level to bring together employment services, training policies, economic development organisations as well as innovation programmes in coordinated efforts to encourage participation in learning and ensure that individuals and employers are able to access relevant and high-quality education and training services (OECD and ILO, 2017b).

3.5 Quality assurance, monitoring and evaluation of LLL

Monitoring and evaluation play an essential role in improving the quality of learning, not only from the perspective of providers but also for learners. However, while most countries devote a significant budget to programmes that encourage training participation, very few monitor outcomes, let alone carry out any sound evaluation of their cost-effectiveness. This is particularly the case with adult learning. Funds collected through levy systems (e.g. *Fondi Interprofessionali* in Italy) or provided through individual training accounts (e.g. *Compte Personnel de Formation* in France) are often used to provide compulsory training such as health and safety courses for employees. This can be considered a potential dead-weight loss as this type of training could have been provided anyway by law.

Another challenge is the weak link between monitoring and evaluation outcomes and policy review. In Brazil for example, the *PRONATEC* programme – an inter-Ministerial programme for the provision of short training courses that are meant to respond to labour market needs – collects data on participant outcomes but the information is not used to feed back into the system and improve it. All programmes facilitating the participation in adult learning should be the subject of systematic evaluations, followed by the relevant programme improvements.

As the provision of training for adults in most countries typically involves a large number of providers and courses, a system of quality assurance is also essential to guide user choice and reward providers that meet quality standards. A recent project co-funded by the European Commission - Financing Adult Learning in Europe, – identifies several indicators to assess the performance of the adult learning system and individual providers, including:

- Efficiency: cost per learning hour
- Effectiveness: returns on investment (employability and wages of participants)
- Quality of staff: percentage of adult learning budget invested in staff development
- Quality of programmes: percentage of adult learning budget invested in course development
- Sustainability: percentage of adult learning budgets invested by individual/non-public sources

Information on these quality criteria are rarely available for adult learning programmes, and providers of all formal and non-formal education and training should be required to meet minimum quality standards.

4. Conclusion

The world of work is undergoing major changes that will continue and potentially intensify in the future. Technological, climate, demographic and other changes will have a profound impact on the world of work, and these changes will affect job availability, the task composition of jobs and the skills required in the labour market. These changes represent not only a challenge but also an opportunity for employment, and in this context, skills development can be an important enabler of productive transformation. At the same time LLL, ALMPs and social protection floors will be important "buffers" to help workers manage transitions between jobs and occupations, and to help enterprises to adjust to change while avoiding high social costs.

Human capital contributes to productivity increases and is instrumental for allowing people to tap new job opportunities arising from global trade, the adoption of new technologies, implementation of climate standards and environmental practices. The composition of employment is shifting towards jobs that require high-level cognitive and social interaction skills or are characterised by non-standardised tasks. The jobs destroyed and those created will require very different sets of skills putting pressure on training systems to provide good foundational skills as well as reskilling and up-skilling opportunities. The transition is proving particularly challenging for low-skilled workers needing significant retraining and facing major financial and non-financial constraints to participation.

Evolving and fast changing labour markets will impose a massive challenge on traditional education and training systems and will require new approaches to lifelong learning, approaches that introduce integrated models of governance and financing in education and training systems and give greater emphasis to local and regional coordination to ensure that employers and individuals are better engaged in education and training.

The frontloading of skills through initial training for a single lifetime qualification is no longer sufficient or effective and is increasingly being challenged in the context of changing skill needsFor the potential of skills development to be realised, the role of non-formal and informal learning that includes adult learning and education, work-based learning and active labour market programmes should be recognised. This will increase the incentives for individuals to invest in training, and also make it easier for them to retrain in areas of high demand. Therefore, ongoing efforts are required to certify learning outcomes and validate or recognise informal and non-formal learning.

Greater attention should also be paid to the involvement of social partners in national, sectoral and local governance arrangements. Their active role in the identification of skills needs, the design of education and training curricula, and in the design and administration of financial incentives can help promote better skills outcomes.

As training markets evolve and the nature of employment changes, training provision and participation should be accessible and encouraged throughout the lifecycle, particularly by low-skilled workers who might bear the brunt of the consequences of automation. To this end, the increase of funding for adult learning and ALMPs will be needed. Financial incentives that address the private sector involvement and encourage individuals' learning uptake should be linked with other interventions. Financial incentives are likely to address only part of the barriers to skills investments that individuals and employers face. Therefore, it will be essential to address non-

financial barriers to training participation by providing guidance, counselling, childcare and support services, and ensure that training provision is flexible enough to overcome time constraints.

Efforts must be made to make the most of the opportunities offered by new technologies in the delivery of training. New technologies can reduce the costs of training and of information, advice and guidance, and can increase both their availability and accessibility.

Finally, in view of diversifying range of public and private providers as well as modes of delivery of LLL, monitoring and evaluation will be an important mechanism to ensure cost-effectiveness and quality of training programmes.

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