



OECD Skills Outlook 2021

LEARNING FOR LIFE



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Foreword

The world has undergone the worst health crisis in a century coupled with a deep shock to the economy and society. Unfortunately, it is only the last – and the worst – of a series of highly disruptive crises the world has experienced in the past 20 years. The recovery plans many countries are putting in place offer a unique opportunity not only to heal the scars of the crisis but also to address key underlining challenges the pandemic has once again highlighted.

For at least a decade, lifelong learning has been considered essential for individuals and societies to navigate a rapidly changing world of work shaken by globalisation, technological and environmental changes as well as demographic changes. In the aftermath of the Covid-19 pandemic, it is essential that lifelong learning becomes a reality to all individuals since the crisis has further accelerated the transformation in our economy and skills needs.

Individuals' ability to adapt and thrive in a fast-evolving world rests on their having acquired strong foundation skills, the willingness to learn and a habit of learning (otherwise known as lifelong learning attitudes). These skills and attitudes are vital for them to absorb and expand the knowledge and skills required to navigate new labour-market needs and life circumstances. However, *walking the talk* of lifelong learning requires a change in mindset: from a vision of learning that is compartmentalised in different phases of life to a process that evolves during all life. The idea that learning only pertains to the young is outdated, and does not meet the demands of societies and labour markets in a constant state of flux. Lifelong learning should start in childhood and youth and must continue throughout adulthood and old age. It should involve formal learning in official settings like schools or training centres, but also informal and non-formal learning (such as learning from co-workers and workplace training), and unintentional learning derived from spontaneous social interactions. Yet, today many adults do not participate – or wish to participate – in workplace learning, and the pandemic further reduced their opportunities to do so.

Thriving lifelong learning systems place learners at the centre. They combine a plethora of learning methods and learning providers, which requires strong accountability and monitoring to promote inclusivity. Not only does a diversified provision of learning opportunities ensure quality, it can also help inform individuals' choices, thereby bolstering their motivation to participate in lifelong learning. Diversified learning systems can spur innovation, leading to the creation of successful learning programmes. However, such initiatives can only be brought to scale through strong co-ordination, knowledge management and information sharing.

This edition of the OECD Skills Outlook shows that public policies can and should play a key role in facilitating effective and inclusive lifelong learning, but much remains to be done. Policies that promote high-quality education, effective vocational education and training, and continuous work-based training generate opportunities for skill development in everyday life. Above all, they help create a culture in which learning is a habit and all individuals are motivated to continue learning, regardless of their current circumstances.

The pandemic forced education systems worldwide to quickly adapt and devise alternatives to face-to-face instruction. As a result, teachers and students have relied on remote teaching and learning on an unprecedented scale. Children's attitudes towards learning play a key role in sustaining learning when regular classroom instruction cannot take place, and parents and teachers have played a fundamental role in helping them develop these crucial attitudes. Policy interventions also helped parents, teachers and schools worldwide make the most of digital learning. They will continue to do so in the future, to prevent early school leaving and ensure that the cohort of children affected by school closures during the global lockdowns will still be able to thrive.

At the same time, although estimated learning losses are highly heterogeneous across sectors and correlate with the extent of shutdowns in economic activities, they are also determined by the competencies workers already possessed – especially their digital skills, and their ability to engage in remote learning and remote working. Therefore, the pandemic likely resulted in fewer learning opportunities for disadvantaged and low-skilled workers – who, in turn, are most likely to need retraining.

Despite the uncertainty the pandemic has created in people's lives, more than ever in the recovery skills will make the difference between staying ahead of the wave or falling behind in a world in constant flux. It will be crucial to invest part of the resources devoted to the recovery to lifelong learning programmes, involving all key stakeholders and with a specific focus on vulnerable groups – young people and among them the NEET (neither in employment, education or training) and the low skilled whose jobs are most at risk of transformation.

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Reader's guide

Country coverage

This publication features data on all OECD countries as well as, when available, comparable data from other countries.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Names used for territorial entities

Data for the Survey of Adult Skills, a product of the Programme for the International Assessment of Adults (PIAAC) for Belgium and the United Kingdom refer to Flanders and England and Northern Ireland respectively.

Data for the Programme for International Student Assessment (PISA) 2018 for B-S-J-Z (China) refer to the four regions in China that participated in PISA 2018: Beijing, Shanghai, Jiangsu and Zhejiang. Data for PISA 2018 for Hong Kong (China), the Netherlands, Portugal and the United States did not meet the PISA technical standards but were accepted as largely comparable in PISA.

Rounding figures

Because of rounding, some figures in tables may not add up exactly to the totals. Totals, differences and averages are always calculated on the basis of exact numbers and are rounded only after calculation.

All standard errors in this publication have been rounded to one or two decimal places. Where the value 0.0 or 0.00 is shown, this does not imply that the standard error is zero, but that it is smaller than 0.05 or 0.005, respectively.

Calculation of international means

This edition of the OECD Skills Outlook aims to provide an authoritative compilation of key international comparisons on lifelong learning. While overall values are given for countries in these comparisons, readers should not assume that countries themselves are homogeneous. The country averages include significant variations among subnational jurisdictions, much as the OECD average encompasses a variety of national experiences.

The OECD average is calculated as the unweighted mean of the data values of all OECD countries for which data are available or can be estimated. The OECD average therefore refers to an average of data values at the level of the national systems and can be used to answer the question of how an indicator value for a given country compares with the value for a typical or average country. It does not take into account the absolute population size of a country.

The EU average is also presented. It is calculated as the unweighted mean of the data values of countries that are members of the European Union for which data are available or can be estimated. The EU average therefore refers to an average of data values at the level of the national systems and can be used to answer the question of how an indicator value for a given country compares with the value for a typical or average country. It does not take into account the absolute population size of a country.

Standard error (S.E.)

The statistical estimates presented in this report are based on samples of children and/or adults, rather than values that could be calculated if every person in the target population in every country had answered every question. Therefore, each estimate has a degree of uncertainty associated with sampling and measurement error, which can be expressed as a standard error. Standard errors used to infer the degree of uncertainty in point estimates and identify the level of confidence with which estimates from different countries or groups within countries are expected to differ.

Reporting student data from PISA

The report uses “15-year-olds” as shorthand for the PISA target population. PISA covers students who are aged between 15 years 3 months and 16 years 2 months at the time of assessment and who are enrolled in school and have completed at least 6 years of formal schooling, regardless of the type of institution in which they are enrolled, and whether they are in full-time or part-time education, whether they attend academic or vocational programmes, and whether they attend public or private schools or foreign schools within the country.

Note regarding Cyprus

Note by Turkey

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Note regarding the Russian Federation

The sample for the Russian Federation in PIAAC does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in the Russian Federation but rather the population of the Russian Federation excluding the population residing in the Moscow municipal area. More detailed information regarding the data from the Russian Federation in PIAAC can be found in the *Technical Report of the Survey of Adult Skills, Third Edition* (OECD, 2019^[1]).

Note regarding Greece

The data for Greece in PIAAC include a large number of cases (1 032) in which there are responses to the background questionnaire but where responses to the assessment are missing. Proficiency scores have been estimated for these respondents based on their responses to the background questionnaire and the population model used to estimate plausible values for responses missing by design derived from the

remaining 3 893 cases. More details can be found in the *Technical Report of the Survey of Adult Skills, Third Edition* (OECD, 2019^[1]).

Reference

OECD (2019), *Technical Report of the Survey of Adult Skills, Third Edition*, ^[1]
https://www.oecd.org/skills/piaac/publications/PIAAC_Technical_Report_2019.pdf.

Acronyms and abbreviations

AFEST	Action de formation en situation de travail
BBC	British Broadcasting Corporation
BLS	U.S. Bureau of Labor and Statistics
Cedefop	European Centre for the Development of Vocational Training
CHC	Cattell-Horn-Carroll
CPD	Continuous professional development
CRM	Customer relationship management
CV	Curriculum vitae
ECEC	Early childhood education and care
ESCoE	Economic Statistics Centre of Excellence
ESCS	Economic, social and cultural status
EUR	Euro
FEST	Formation en Situation de Travail
GDP	Gross domestic product
GVC	Global value chain
HPWP	High-performance work practices
HVAC	Heating, ventilation and air conditioning
ICT	Information and communication technology
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification of All Economic Activities
LLL	Lifelong learning
LLLA	Lifelong learning attitude
ML	Machine learning
NEET	Not in education, employment or training
NLP	Natural language processing
OLS	Ordinary least squares
OxCGRT	Oxford Covid-19 Government Response Tracker
PIAAC	Programme for the International Assessment of Adult Competencies
PIRLS	Progress in International Reading Literacy
PISA	Programme for International Student Assessment
RPL	Recognition of prior learning
RVA	Recognition, validation and accreditation
SES	Socio-economic status
SME	Small and medium-sized enterprise
SQL	Structured query language
TIMSS	Trends in International Mathematics and Science Study
TIPS	Teachers Involve Parents in Schoolwork
TP	Teacher practice
US	United States
USD	United States dollar
VET	Vocational education and training

Executive summary

Lifelong learning is key for individuals to adapt and succeed in labour markets and societies shaped by longer life expectancy, rapid technological advances, globalisation and demographic change, as well as sudden shocks such as the COVID-19 pandemic. Lifelong learning starts in childhood and youth, continuing throughout adulthood and old age. It encompasses formal learning in settings such as schools and training centres, informal and non-formal learning derived from colleagues and workplace trainers, and unintentional learning stemming from spontaneous social interactions.

The *OECD Skills Outlook 2021* provides insights on how countries can best support lifelong learning for all and individuals' ability to learn how to learn.

Building the foundations of lifelong learning

Early learning is crucial to equip children with strong skills and learning attitudes, with the crucial support of teachers and parents. Positive learning attitudes are associated with higher proficiency in mathematics, reading and science, as well as ambitious educational and career expectations. Not all youngsters develop them: socio-economically disadvantaged children, boys and children with an immigrant background too often develop lower skills and learning attitudes. Yet these were especially important as a result of disruptions to regular schooling created by the COVID-19 pandemic: remote schooling required even more intrinsic motivation and self-directed learning than regular schooling.

The disruptions to regular schooling caused by the pandemic led many children to progress less than expected in skill development. The sudden and forced closure of schools may have led some to build a strong attachment to learning but for others school closures may have meant lack of engagement and motivation. In the short term, the pandemic could lead to increases in early school leavers. In the medium and long term, lower engagement could result in the current generation of students failing to develop positive learning attitudes, at a time of profound structural changes that will require individuals to upgrade their skills throughout their life.

Promoting effective transitions into further education, training and the labour market

Before the pandemic, low-achieving secondary-school students in many OECD countries were already displaying declining levels of proficiency in literacy.

The period between the end of compulsory schooling and young adulthood is generally marked by a rapid increase in foundation skills, such as, for example, literacy. Results suggest that on average literacy achievement was 14 points on the PIAAC scale higher at age 27 than that observed among the same birth cohort at age 15. Differences in skill growth across countries were strongly related to the share of individuals not in education, employment or training (NEET). Reductions in NEET rates resulted in decreased disparities in achievement and intergenerational transmission of educational advantages.

High-quality orientation programmes (including internships and job shadowing) informing school-aged children about further education and the labour market can reduce NEET rates. Creating stronger connections between schools and the labour market could be especially important in the wake of the pandemic, not only to reduce the number of school leavers who will become NEET, but also to ensure that youngsters understand changing workplace requirements.

Engaging adults in learning

The pandemic caused major disruptions in the provision of higher education programmes, vocational education and training, potentially creating difficulties during the transition from compulsory schooling into young adulthood and compounding the risk of low investment in adult learning.

Willingness to participate in adult learning is already modest: on average, around one in two adults in OECD countries was already disengaged from adult learning before the pandemic. Educational attainment was one of the strongest predictors of the willingness to learn: on average, tertiary-educated adults were half as likely to be disengaged from adult learning than workers with lower-secondary education or below.

Containment and mitigation strategies related to the pandemic have also had large direct and indirect effects on participation in adult learning among those willing to participate. Estimates suggest that across the OECD region, non-formal learning opportunities may have decreased by an average of 18% and informal learning opportunities by 25%.

The role of transversal skills in enabling individuals to thrive in the labour market

Evidence from online job vacancy data reveals that communication, teamwork and organisational skills are among the transversal skills most frequently demanded by employers in a wide variety of occupations. Cognitive skills, such as analytical, problem-solving, digital, leadership and presentation skills are also highly transversal across jobs and work contexts. While the pandemic heightened the importance of building skill sets that strengthen individuals' resilience to change, evidence shows that the labour market returns associated with transversal skills can vary depending on how they bundle with other skills and across job roles. Employers should be supported in providing effective lifelong learning to their employees so that they can develop the right mix of transversal and technical skills that they need to thrive.

Protecting workers from demand shocks and long-term structural changes

COVID-19 caused major disruptions to labour markets worldwide, including large contractions in employment and in job creation. Evidence shows that by May 2020, the volume of online job vacancies had dropped by more than 40% in most countries compared to the beginning of the year. Job postings requiring individuals to work from home soared, driving home the need for workers to possess digital skills. Low-educated workers were particularly affected by declining openings in the early phase of the pandemic.

In the longer term, the effect of the pandemic on jobs is likely going to interact with existing structural changes such as digitalisation and population ageing, reshaping the demand for digital skills and occupations in the healthcare sector. Similarly, across the OECD, planned investments in green technologies and renewable energy are likely to increase the demand for specialists in those areas, potentially creating skill gaps that lifelong learning systems will be called to fill.

Key recommendations

- **Place learners at the centre of learning:** Diversified learning opportunities can enhance the quality of education and training. They can also empower individuals to make relevant choices, thus sustaining their motivation to participate in lifelong learning. Policy design must be inclusive, affordable, accessible and adaptable.
- **Skills for a lifetime:** Lifelong learning rests on strong foundation skills, the willingness to learn and a habit of learning, all of which are vital if individuals are to acquire the skills and knowledge to navigate changing labour-market needs and life circumstances. Policies should harness the power of technology, but doing so considering the effects technology can have on existing skills inequalities and the creation of new ones.
- **Strong co-ordination is needed to support learning providers in developing high quality, inclusive learning:** Diversified learning systems can spur innovation in creating successful learning programmes. However, policies should build strong co-ordination, knowledge management and information sharing in order to bring such initiatives to scale. Policies should also be aimed at improving recognition, validation and accreditation procedures to enhance the visibility and transferability of the skills taught in these programmes. Finally, partnerships across different actors should be promoted to create synergies and maximise learning opportunities.

Infographic 1. Key facts and figures

Many adults do not participate in learning, especially among the low-educated



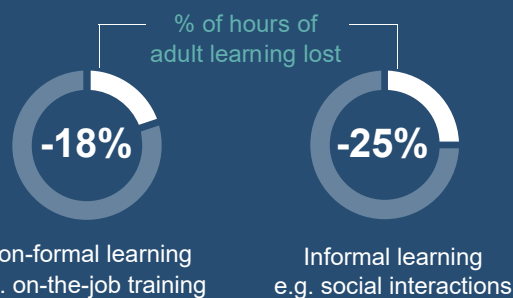
About 4 out of 10 high-educated adults do not participate in formal or non-formal learning.

About 8 out of 10 low-educated adults do not participate in formal or non-formal learning.



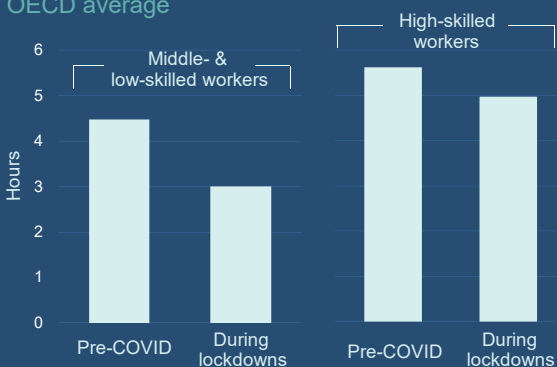
Hours of adult learning dropped during widespread COVID-19 lockdowns

Estimated hours lost during widespread lockdowns in 2020/2021



Drop in adult learning worse for middle- and low-skilled workers

Estimated weekly hours of informal learning per worker OECD average

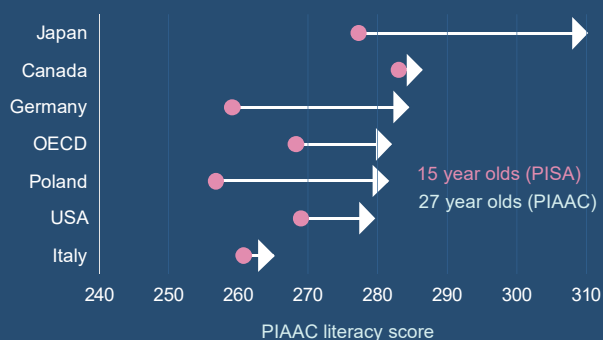


Fall in job vacancies varied depending on required education level



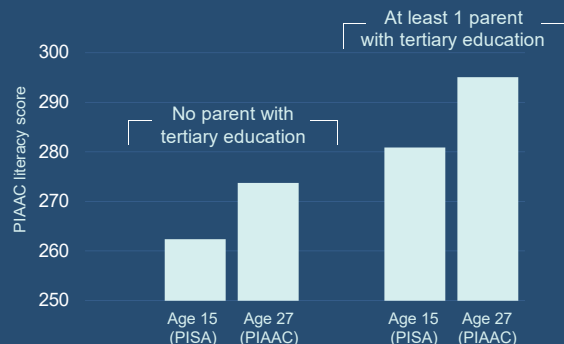
Skill development is uneven during the key transition years

Low growth in literacy achievement between age 15 and 27 puts future development opportunities at risk



Socio-economic disadvantages hamper skills at school and in transition years

Disadvantaged children generally have lower literacy scores at age 15 and the gap is even wider at age 27



1 Overview

This chapter summarises the main findings of the report. It introduces the concept of lifelong learning and discusses how the development of lifelong learning policies requires a profound paradigm change to ensure learning is responsive to lifelong evolutions. Lifelong learning is necessarily “lifewide”. It capitalises on individuals’ ability and willingness to acquire different skills and knowledge at different stages of their lives and in different contexts. The chapter presents key indicators allowing countries to benchmark their lifelong learning systems. It concludes by highlighting a set of policy principles that can guide the development of effective lifelong learning policies.

Policy implications

Recognise the heterogeneous nature of lifelong learning and lifelong learners. Lifelong learning occurs in formal, non-formal and informal settings. It involves individuals both young and old, with different experiences, motivations and attitudes. These differences influence not only whether and how people learn, but also their learning objectives. It is therefore essential to diversify the content and provision of learning, to account for the inherently heterogeneous nature of learning and learners. However, heterogeneity in learners' profiles, learning objectives, socio-demographic characteristics, attitudes towards learning and learning goals should be managed so that it does not lead to a strong separation in learning pathways, with important risks to social cohesion and inclusiveness.

Empower learners to engage in lifelong learning. Policy making should build trust in lifelong learning, but also trust learners to make the right choices. It should be learner-centric, facilitating individuals' learning journeys and empowering them with initial skills and information that will allow them to define and continually update their learning paths.

Promote information sharing. Educational and career guidance and orientation programmes should provide information on different occupations, the skills and knowledge required upon entry, and opportunities for career progression. Individuals learn about different occupations' financial rewards, opportunities for self-expression, time commitments, work environment and work-life balance.

Policy design should consider individuals' various learning objectives. The allocation public support for learning choices should be based on the distribution of benefits across individuals, existing employers and society as a whole. When evaluating the social benefits, policy makers should include a wide variety of perspectives and consider a broad range of benefits. Inclusiveness at the objective-setting stage is crucial to guarantee inclusiveness in participation and outcomes.

Embrace inclusiveness as a policy objective. Public policy has often aimed for parity of participation in learning. This objective should be replaced by a focus on inclusive policy design and implementation. Inclusive policy formulation ensures that learners are at the centre of decision-making. It can build engagement and motivation to participate in learning, by ensuring that learning provision is relevant to the short-, medium- and long-term needs of individual learners. In this manner, learners are active participants in defining learning paths that are not only affordable and accessible, but also adaptable and acceptable to all.

Public policy should promote affordability as a goal. The immediate costs of providing and participating in lifelong learning should be spread across individuals, employers and the broader community, recognising the long-term distributed benefits. In the same vein, the medium- and long-term costs of inaction should be considered alongside the immediate costs of organising provision.

Accessibility should be embraced in the design of learning programmes. This could eliminate barriers to participation, particularly of marginalised and socio-economically disadvantaged groups. Adaptability and acceptability should be paramount, with both learners and educators engaged in defining learning goals and learning methods. Thus, adopting holistic approaches when co-designing and co-ordinating programmes and strategies will not only help address learning needs and demands in a comprehensive manner, but will also promote willingness to participate and active engagement among participants.

Harness the power of technology to expand access to lifelong learning opportunities while keeping in mind the inequalities it can create. Technology lowers the cost of accessing opportunities to develop technical skills and, as such, can be a powerful tool to promote engagement in lifelong learning. By relaxing the need for learners' physical presence at a specific time and place, technology can promote participation in learning opportunities among groups that have important time constraints or live in remote areas, entailing prohibitive travel costs to access physical learning spaces. Technology can also help organise learning opportunities matching specific learner objectives and profiles, by creating a critical mass of learners with similar needs to make such training viable. However, not all learning objectives and profiles can be adequately served by technology-based delivery. For example, individuals who lack digital skills and adequate technical infrastructure (e.g. hardware, software and connectivity) are excluded from learning opportunities that rely on such skills and technology. Furthermore, while technology can be exploited to pursue (formal) learning opportunities, it can hardly substitute for other forms of learning, such as informal workplace learning. Finally, while many forms of formal learning can be replaced by remote/online learning, other forms of learning cannot.

Build strong foundation skills, including positive attitudes towards lifelong learning. Strong foundation skills depend on both the ability and willingness to learn and put skills and knowledge to use. Information-processing skills, such as literacy and numeracy, remain key to ensure that individuals can build a broad set of skills, acquire knowledge and information, and mobilise such information effectively. Developing a habit of learning – i.e. lifelong learning attitudes – is equally important to developing information-processing abilities, so that learners can build on initial skills and adapt to changing circumstances.

Promote innovation, identify successful programmes and develop strategies to bring them to scale through continuous monitoring. The current fragmentation of formal, informal and non-formal learning provision can be exploited to promote experimentation in learning provision through innovative programmes and approaches, and a culture of programme evaluation.

Develop information systems that help monitor the effectiveness of different initiatives, identifying those that promote good outcomes, and learning from both successes and failures. Investments should also be made to determine which programmes could be brought to scale and which, by contrast, owe their success to unique characteristics that are difficult to replicate (such as the presence of an especially charismatic leader, or close ties between local employers and schools). Because learners' profiles and the context in which lifelong learning occurs change over time, the content, organisation and objectives of lifelong learning should change as well. The effectiveness of programmes and initiatives should be evaluated periodically, and the results used to update and upgrade lifelong learning frameworks and guidance.

Diversify validation and accreditation to value and recognise different forms of learning. Recognition, validation and accreditation (RVA) procedures, including for prior learning, are key to promoting lifelong learning. In OECD member countries, however, they are too often still non-existent or overly cumbersome. Hence, it is necessary to simplify RVA processes for lifelong learning, which largely involves non-formal and informal learning, by ensuring that national frameworks for RVA are communicated effectively and implemented by employers. Improved RVA procedures will empower employees, making their skills both more visible and transferable.

Create partnerships across actors. A wide range of stakeholders – including schools, the higher education sector, vocational education and training institutions, employers, associations, and civil society organisations – can help promote lifelong learning by catering to the diverse needs of different communities. Creating synergies across sectors can also ensure that individuals can navigate smoothly the transitions between forms of learning and learning at different stages. Creating partnerships across actors can also maximise opportunities for all to engage in lifelong learning.

Encourage employers to support lifelong learning. Employers could receive support to ensure that workers can participate in lifelong learning opportunities aimed at building their skills. Such support could be based on funding formulas that adequately incentivise employers to invest in learning. Employers should join forces with other local actors to provide guidance on learning opportunities to the community, thus minimising transaction and information-acquisition costs. Small enterprises and self-employed individuals should be supported in gaining access to learning opportunities.

Introduction

Before the term “lifelong learning” was used to characterise all forms of skill and competency development over the lifecycle, Paul Lengrand introduced the concept of “lifelong education” in the 1960s. Lifelong education emphasised the importance of continuous education from school to the working life (Lengrand, 1975^[1]). The concept arose in a period characterised by rapid demographic and technological progress. Today, developing systems that help individuals master the skills needed to successfully engage with the labour market or society is still highly relevant.

To ensure that all individuals are able to adapt and thrive in a rapidly changing world, it is crucial that they can access opportunities to develop and enhance their proficiency in a broad set of skills throughout their lives. The process starts in childhood and youth, continuing throughout adulthood and into old age: as its name indicates, lifelong learning happens from “the cradle to the grave”.

Designing skills policies that consider lifelong learning entails adopting both a “lifewide” and a lifelong perspective. Lifewide learning encompasses formal learning that takes place in formal settings like schools or training centres, non-formal learning (e.g. on-the-job training), informal learning (e.g. learning from co-workers) and unintentional learning derived from spontaneous social interactions in people’s homes and communities (OECD, 2019^[2]). When policies focus on lifelong and lifewide learning, they inevitably emphasise socio-emotional and motivational factors, such as willingness to learn, openness to different perspectives and perseverance. Individuals who engage in lifelong and lifewide learning must be committed to making space for learning, and approach everyday activities with the aim of improving their skills and accumulating knowledge. Lifelong learning does not involve clear learning paths leading to a well-defined destination. It is a process that guides and helps individuals navigate a reality in which the goal is continually redefined because of a changing world.

Lifelong learning is key if individuals are to succeed in labour markets and societies shaped by megatrends, such as increases in life expectancy, rapid technological changes, globalisation, migration, environmental changes and digitalisation, as well as sudden shocks such as the COVID-19 pandemic. In a fast-changing and uncertain world, lifelong learning can help individuals adapt and become resilient to external shocks, lowering their vulnerability. While providing support to individuals remains important to ensure that major structural changes do not lead to deep tears in the social fabric, creating a culture of lifelong learning gives individuals agency to manage change. This calls for evidence on the best ways to support lifelong learning journeys so that individuals can “learn how to learn”.

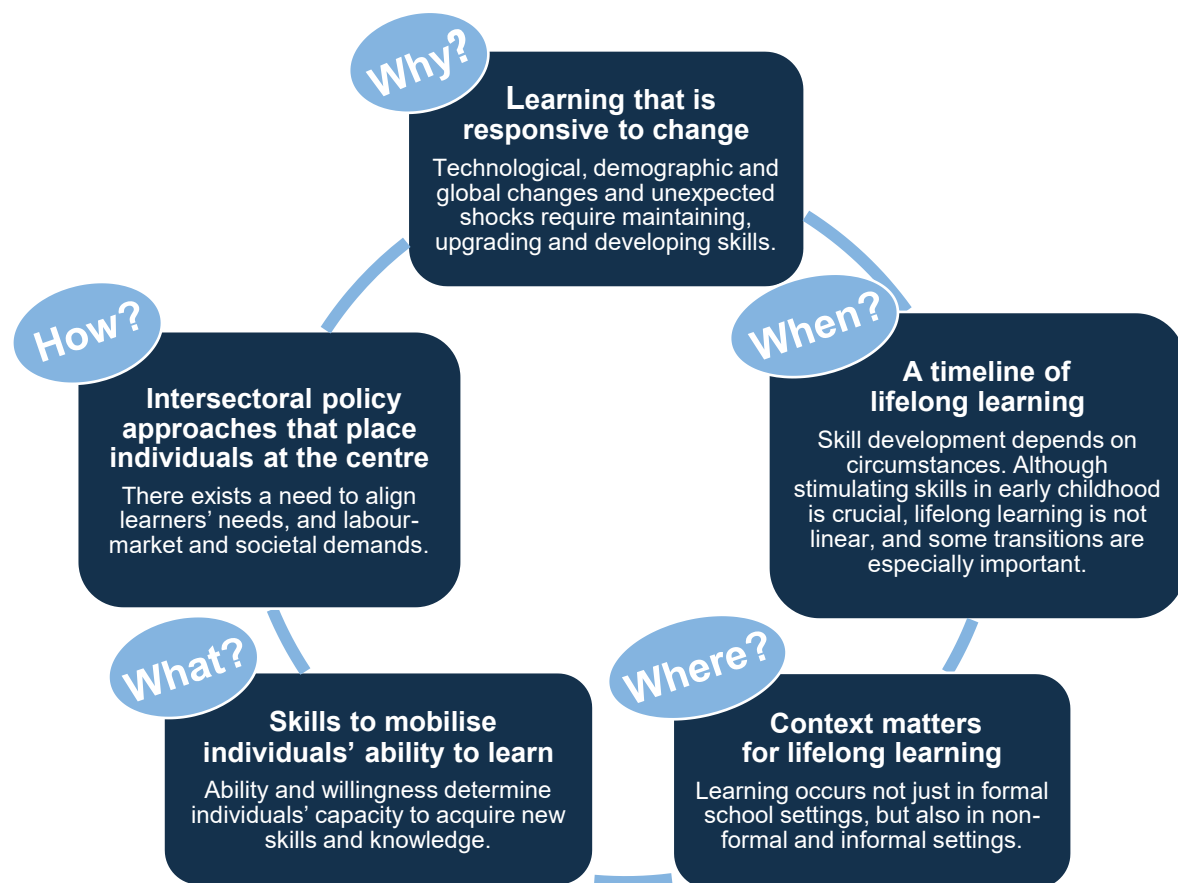
Disparities in access to learning opportunities in the early years have been extensively examined. Through its Programme for International Student Assessment (PISA), the OECD has played a key role in providing policy makers with detailed evidence on disparities, for instance by socio-economic condition, immigrant background and gender. Together with other international large-scale assessments of student populations, such as the Trends in International Mathematics and Science Study (TIMSS), and the Progress in International Reading Literacy Study (PIRLS), PISA has prompted government efforts to improve school systems around the world, both in terms of overall achievement in standardised tests and reducing disparities in achievement levels across demographic groups.

As important as schools are to reduce disparities in skill development, the large variations in access to learning opportunities outside of formal education, both in childhood and adulthood, are among the primary mechanisms driving persistent social and economic inequalities (Cunha et al., 2006^[3]). Mapping lifelong learning processes, and ensuring that such processes do not create increasingly diverging opportunities, is key to drafting policies that help societies move towards greater equity and inclusion.

The first step in designing effective lifelong learning policies is to identify all the stages in which learning can occur, how learning at each stage builds upon what happened at previous stages, and which factors promote successful transitions between stages. To this end, it is crucial to understand how learning at any given stage influences learning decisions and learning outcomes at later stages. Such interdependency arises because learning processes are characterised by complementarity rather than substitution: human brains do not have a fixed capacity to learn and do not fill up with finite amounts of information like baskets, drawers or backpacks. Acquiring new skills is easier for individuals who learned other skills in the past and have developed a habit of learning (Cunha and Heckman, 2007^[4]).

Furthermore, although learning occurs across the lifecycle, certain skills can be acquired more easily and efficiently early on, providing a long-term foundation for developing other skills as needed. Finally, strong collaboration across different sectors is crucial to ensure successful lifelong learning policies. At the government level, this requires strategic planning, co-ordination and buy-in on the part of central and local governments. It also entails devising coherent education, labour-market, economic development, social and welfare policies. Lifelong learning policies require co-operation between the public, the private sector and civil society groups, because learning can occur and be promoted in different settings. Figure 1.1 proposes a framework for understanding lifelong learning. It illustrates how decision makers need to consider five interrelated questions if lifelong learning policies are to succeed.

Figure 1.1. Framework of lifelong learning



Why focus on lifelong learning?

The technological, demographic and global changes have exacerbated the need to reframe learning with a lifelong perspective.

Fast-evolving technology has changed the nature of the skills required and rewarded in the labour market. On the one hand, the skills learned in the context of formal education or a job become obsolete more quickly. As a result, workers need to maintain, upgrade and expand their skills in order to adapt to and, if possible, anticipate technological developments. Digitalisation and automation at work mean that some of the skills needed to perform routine tasks and often used intensively in certain occupations, such as administration and production, are now less relevant (Autor, Levy and Murnane, 2003^[5]; Spitz-Oener, 2006^[6]). As a result, demand for certain skills in the labour market has declined, as shown in Chapter 5 of this report. On the other hand, technology also creates job opportunities requiring non-routine cognitive and interpersonal skills. Adapting to technological changes entails proactively engaging in learning, constantly building on solid foundation skills with specific competencies and abilities as well as skills knowledge. A simple tri-period view of life, exemplified by education-work-retirement, is obsolete in such a rapidly evolving context. If skills are defined as the capacity to carry out a complex and well-organised pattern of thinking (in the case of cognitive skills) or behaviours (in the case of behavioural skills) to achieve specific goals, then changing goals and changing contexts require individuals to acquire new skills or adapt those they developed in the past.

In the recent past, broadly corresponding to the period following the Second World War, rapid technological and social progress transformed when and how the general population acquired skills. Before the war, investments in initial education and training were limited. Few individuals continued their studies beyond the end of compulsory schooling, and only a minority participated in higher education: most developed their skills and knowledge on the job, through apprenticeships and non-formal learning. The emergence of large corporations, coupled with the expectation that workers would remain at the same firm throughout their working lives, drove the development of employer-sponsored formal and informal training within firms. Such programmes were designed to equip workers with skills that would benefit the growing firm, through greater productivity, and the worker, through career progression and higher wages. In the post-war period, rapid technological progress, higher economic well-being and intense international competition drove investments in initial education and training. In the United States and then elsewhere, initiatives emerged that extended the length of compulsory schooling, and then encouraged wider participation in post-secondary and tertiary education.

These advances led to a profound reorientation of skill investments and a polarisation of learning pathways. Individuals who invested heavily in initial education and training typically continued to develop skills by participating in adult learning programmes, allowing them to exploit technological innovations and acquire complementary skills. Those who did not invest in initial education and training – and who therefore stood to benefit the most from developing their skills as adults – often failed to do so. As a result, many of these workers failed to adapt to technological innovations.

Technological innovations interact with other factors to shape the need for individuals to invest in learning over the life course. Life expectancy is increasing in many OECD countries, while birth rates are declining. Individuals are increasingly required to work longer and invest in lifelong learning, both to maintain existing skills and acquire new skills, despite natural ageing processes. The share of the population aged 50 and older is projected to grow from 37% in 2020 to 45% across OECD countries by 2050, leading to increases in the retirement age and potentially less generous pension schemes (OECD, 2020^[7]). Meanwhile, governments are taking action to mitigate the effects of global warming, climate change and pollution levels, with far-reaching implications on industrial policies, and structural investments leading to a reallocation of production among sectors and industries.

As technological, demographic and environmental changes, along with globalisation, are making it even more relevant to engage in lifelong learning, the labour market is evolving in ways that can make it harder for many workers to do so, precisely when it is most needed. For example, employers are increasingly resorting to short-term and temporary contracts, so that workers often need to acquire new job-specific knowledge and skills. Such contracts also reduce incentives for employers to invest in skill development for temporary workers, as such investments reduce current output and benefits typically accrue over a longer timeframe.

Two major shocks in the past 15 years have influenced labour markets worldwide, with important implications for individuals' ability to pursue lifelong learning and potential labour-market restructuring. The great financial crisis of 2008 and the ongoing COVID-19 pandemic have led to large increases in the number of individuals who are not working, particularly youngsters, whose career prospects may suffer in the long term because of their inability to engage in learning at work. Furthermore, disruptions leading to a growing reliance on digital tools, have increased the need for individuals to engage in learning opportunities that equip them with specific digital skills.

Finally, globalisation affects local demand for skills through shifting industrial and occupational structures in response to market integration and international competitions, as well as the accelerating transnational migration of workers up until the pandemic struck. Even migrants who resettle because of employment will need to adapt or acquire knowledge and skills to operate effectively in a new economic and social context. Individuals who are forced to migrate because of environmental or geopolitical upheavals are likely to have even greater learning needs. Yet migrants may struggle to access learning opportunities because of

linguistic barriers, insufficient information, difficulties in having their qualifications and licences recognised, and a lack of established social networks.

When does learning occur? The stages of lifelong learning

Lifelong learning encompasses all forms of skill development and knowledge acquisition occurring over the lifecycle. Learning is a dynamic and long-lasting process that begins in childhood, continues during the schooling years, and lasts well into adulthood and even retirement. What is being learned, and how learning occurs, can differ over the lifecycle: what one is able to learn, and how efficiently one learns, depends on the interaction between biological determinants and social/institutional settings. Skills can be developed at different stages, and those that are acquired in a particular phase tend to facilitate the acquisition of new skills at subsequent stages. Therefore, skill development that takes place later in life depends on the stock of skills acquired earlier in life, as well as on prior investments: the benefits of investments in skill development at any one point depend on the level of skills an individual previously acquired (Kautz et al., 2014^[8]).

Although skills can be acquired throughout life, certain periods are critical for developing specific skills. For example, individuals' general ability to learn (fluid intelligence) can be influenced prenatally and until adolescence. It cannot be easily modified beyond this early period, although growing evidence shows that the malleability of specific skills depends on each individual's social context (Turkheimer et al., 2003^[9]). Similarly, while socio-emotional and motivational skills start forming early, they are malleable until later stages, and certainly into young adulthood. This suggests that while early childhood remains a sensitive period for stimulating skills, interventions in adulthood can still shape skill development (Kautz et al., 2014^[8]). By contrast, knowledge and experience (crystallised intelligence) can be acquired throughout the life course.

Where does learning occur? Setting matters for lifelong learning

Lifelong learning covers not only learning that takes place in formal settings like schools, higher education institutions, or vocational education and training centres, but also informal and non-formal learning imparted in workplaces, and unintentional learning stemming from spontaneous social interactions in people's homes and communities (OECD, 2019^[2]). Thus, learning can be characterised as “formal”, “non-formal” and “informal”, depending on the form it takes.

Formal learning is structured around well-specified objectives, and produces qualifications certifying the learner has met these objectives. Non-formal learning comprises organised learning that is designed to impart certain skills or knowledge, but is not recognised through formal certifications or qualifications. Participation in workshops and employer-provided training are forms of non-formal learning. Informal learning involves learning that is not organised nor objective-oriented, including learning through social interactions in school, work or general community settings. Activities that require learning from others and learning by doing are forms of informal learning.

Technology enables new forms of learning: individuals can participate in learning activities anytime and anywhere if they have the right tools and connectivity, and the ability to use them. For example, teleconferencing facilities allow individuals to participate in formal or non-formal learning sessions while at home or at work organised and delivered by instructors. Asynchronous training further expands opportunities to access learning: not only can individuals access such materials from anywhere (rather than from designated training centres), but they can also do so in their own time, fitting learning opportunities around other commitments rather than the other way around. Digital technologies, such as virtual reality systems, also allow learners to acquire and practice skills safely and cheaply, working on

simulated scenarios that would normally entail operating complex machines or performing procedures on live individuals.

Although technology can reduce the barriers to participation in lifelong learning related to time use and allocation, it creates new barriers related to the availability of adequate equipment and connectivity. Today, the ability to acquire new skills through technology is even more dependent on prior skills than the acquisition of new skills in face-to-face settings. First, individuals must possess digital skills. Second, they must have the capacity to initiate and sustain self-regulated learning with low levels of external motivational drivers (such as a teacher or colleague) and without a prior social commitment to engage in learning at a specific time and place.

Just as some skills are best developed at different stages of individuals' lives, so are different skills best developed in different settings, so that various settings could be used to ensure effective skill development. For example, some learners may feel threatened, intimidated or unmotivated by schools and formal education, for a variety of reasons: they may dislike the way in which learning is typically structured in such settings, they had negative experiences as youngsters, or they face discrimination and prejudice. For these individuals, learning from colleagues in non-formal and informal contexts, which are less characterised by power dynamics, and where learning is less abstract and more practical, could prove more conducive to acquiring skills. Moreover, while formal settings may be best suited to helping individuals acquire foundation skills, non-formal and informal settings could be more effective at promoting specific skills and knowledge.

What learning? Skills to mobilise individuals' knowledge, attitudes and values

To thrive in labour markets and societies, individuals must possess a combination of skills and knowledge, and be able to acquire new skills and new knowledge when needed. At the individual level, the capacity to adjust to changing circumstances rests on the ability and willingness to learn new skills. At the societal level, economic growth and social cohesion in a period of rapid technological and social transformations depend on individuals' goals and objectives when using their skills in the workplace and everyday life.

Building strong foundation skills in initial education and training is crucial if individuals are to possess the cognitive capacity to acquire new skills and knowledge, as well as the emotional and motivational capacity to do so. Effectively engaging in lifelong learning means that individuals can pursue learning paths that are both aligned with their personal goals and relevant to the needs of the labour market.

Psychological research on intelligence can be used to characterise skills, and how they interact with knowledge. Intelligence, as conceived by Gottfredson (1997^[10]) and Neisser et al. (1996^[11]) comprises the capacity to solve problems, understand complex ideas and think abstractly while learning from experience and adapting to the context in which reasoning takes place. According to Hunt (2009, p. 20^[12]), this capacity is "produced by an interaction between genetic potential and environmental support" and as such, is malleable to context, individual choices and policy interventions. Promoting this capacity is therefore a key objective of lifelong learning.

The Carroll model of intelligence provides a categorisation of intelligence, comprising a lower stratum of 50 to 60 narrowly defined independent abilities, 8 to 10 broad independent abilities, and a higher single factor "g" of general intellectual ability (Carroll, 1993^[13]). This categorisation was further refined in the Cattell-Horn-Carroll factor model, which integrates the Carroll model with Cattell's (1963^[14]) distinction between fluid and crystallised intelligence at the middle stratum. Fluid intelligence comprises the ability to solve novel reasoning problems and is independent of acquired knowledge, whereas crystallised intelligence involves acquired knowledge and characterises the ability to use it to solve problems.

Understanding the distinctions between higher-level constructs and narrowly defined abilities, and between abilities that rely on knowledge and those that do not, are crucial to developing effective lifelong learning

skills policies. However, such policies also depend on a vital ingredient without which active participation in learning is impossible: the motivation to learn. Motivation shapes engagement and participation in learning. It also determines whether participation effectively results in the development of skills and acquisition of knowledge.

How to promote lifelong learning? Intersectoral policy approaches that place learners at the centre

Lifelong learning policies require strong co-ordination between different actors and institutions to ensure that individuals learn to learn as youngsters and remain motivated to keep learning throughout life. Promoting participation in lifelong learning entails mobilising a range of stakeholders, ideally while considering the interrelated nature of learning experiences. The aim is to ensure that learners of all ages and backgrounds engage durably in the process, by developing learning pathways that enable them to participate actively in the design and implementation of learning opportunities. This requires an approach that is centred on the needs of learners, but also responsive to the evolving demand for skills and knowledge in the labour market and society.

The design of lifelong learning policies rests on the actions of professionals specialised in the early years, including early childhood educators, teachers, school principals and local education officers, as well as orientation specialists operating in schools and career advisors outside of schools. It relies on collaboration between tertiary education professionals, vocational education and training professionals, and social partners engaged in preventing early school leaving. It builds on the collaboration between public and private actors, including employers, national and local-level policy makers, business associations, worker unions and non-governmental organisations. It acknowledges the potential value of peer and intergenerational learning, but also directs resources to ensure that the informal and non-formal transmission of learning opportunities does not create persistent disparities but rather, promotes social cohesion and societal well-being.

Lifelong learning can allow individuals to be flexible and adaptable, but its organisation depends on strong co-ordination among policy sectors. For example, as family responsibilities are a key barrier to participation among many workers, supporting participation entails delivering opportunities that workers recognise as being relevant to them, as well as promoting access to childcare or elderly care, and providing financial support to make it affordable. Barriers to participation in learning are often interrelated; they should not be tackled in isolation, but rather through comprehensive strategies. Such strategies should also be well-aligned with other policy areas (including labour and social policy) to avoid conflicting incentives and misaligned objectives.

The following sections in this chapter summarise the key findings emerging from the analyses conducted and the review of policy approaches to support lifelong learning.

Starting young: Building the foundations of lifelong learning

Young people's attitudes towards learning shape how well they acquire skills in school. It also increases the likelihood that they will remain engaged with learning as adults, because learning becomes a habit.

Evidence from the 2018 PISA study indicates that when comparing 15-year-old students with similar characteristics in terms of socio-economic background, gender, age, immigration status and type of school attended, youngsters who developed stronger attitudes towards learning performed significantly better in reading, mathematics and science than those with weaker attitudes. In other words, they developed stronger foundation skills allowing them to process information. Students' *enjoyment of reading*, *motivation to master tasks* and *self-efficacy* in particular were highly associated with achievement. At the same time,

students with strong learning attitudes generally expected to remain in education longer and to work as professionals and managers – careers that require continuous learning and professional development, as well as important investments in skill development through participation in tertiary-level education.

As important as learning attitudes are in general, they have been especially important in the face of disruptions to regular schooling worldwide since the COVID-19 pandemic hit in 2020. Among the many challenges facing school-aged learners is the need to rely much more on intrinsic motivation and self-directed learning than during in-person schooling. Such dispositions to learning are particularly important for students from lower socio-economic backgrounds, who are generally less likely to receive support from their families or to have access to good information and communication technology infrastructure at home. Many of these learners have had their learning progression disrupted during distant learning and home schooling, and only those with high motivation to learn have been able to remain engaged in learning. Strong motivation is therefore essential, on a par with connectivity, access to digital devices and digital skills for both students and teachers.

Nevertheless, Table 1.1 indicates that not all students were equally likely to have developed strong learning attitudes by the time the pandemic disrupted schooling worldwide and many of these learners may have had their learning progression especially disrupted as a result. On average, students with at least one parent who obtained tertiary qualifications had levels of enjoyment of reading that were around 20% of a standard deviation higher than students whose parents did not obtain tertiary qualifications. Similarly, they reported levels of self-efficacy that were 10% of a standard deviation higher than students whose parents did not obtain tertiary qualifications. Socio-economically disadvantaged students, boys, and students with an immigrant background were considerably less likely to have developed positive learning attitudes by the age of 15. Socio-economic disparities were more pronounced than the OECD average in Australia and Germany, and less pronounced in Latvia, the United Kingdom and the United States. Gender disparities were most marked in Germany and Turkey. Disparities by immigrant status were the widest in Sweden and the United Kingdom. Girls expressed considerably higher levels of enjoyment of reading than boys – on average, differences were as high as 60% of a standard deviation across OECD countries – but they reported marginally lower levels of self-efficacy than boys.

Table 1.1. Snapshot of learning attitudes at age 15

	Index of enjoyment of reading				Index of self-efficacy			
	Mean index	High vs. low parental education ¹	Girls vs. boys	Immigrant vs. native	Mean index	High vs. low parental education ¹	Girls vs. boys	Immigrant vs. native
	Mean	Index diff.	Index diff.	Index diff.	Mean	Index diff.	Index diff.	Index diff.
OECD average	-0.05	0.192	0.596	0.067	0.00	0.115	-0.086	0.015
EU average	-0.10	0.190	0.650	0.005	-0.01	0.111	-0.068	-0.006
Australia	-0.13	0.263	0.534	0.154	0.03	0.192	-0.065	0.108
Austria	-0.28	0.185	0.755	-0.046	0.08	0.100	0.001	0.018
Belgium	-0.44	0.184	0.571	0.207	-0.21	0.057	-0.184	0.247
Canada	0.01	0.193	0.631	0.180	0.13	0.150	-0.107	0.093
Chile	0.04	0.309	0.611	0.088	0.29	0.069	-0.117	0.032
Czech Republic	-0.05	0.307	0.787	-0.011	-0.28	0.062	-0.067	-0.113
Denmark	-0.37	0.302	0.477	0.245	0.05	0.111	-0.224	0.001
Estonia	0.00	0.221	0.691	0.077	-0.03	0.186	-0.050	-0.130
Finland	-0.25	0.139	0.698	0.113	-0.03	0.144	-0.027	-0.016
France	-0.12	0.193	0.559	-0.088	-0.10	0.168	-0.240	0.194
Germany	-0.29	0.279	0.825	-0.013	-0.02	0.234	-0.130	0.001
Greece	0.11	0.236	0.568	-0.095	0.05	0.120	-0.024	-0.121
Hungary	0.03	0.171	0.815	0.109	0.17	0.111	-0.085	0.137

	Index of enjoyment of reading				Index of self-efficacy			
	Mean index	High vs. low parental education ¹	Girls vs. boys	Immigrant vs. native	Mean index	High vs. low parental education ¹	Girls vs. boys	Immigrant vs. native
	Mean	Index diff.	Index diff.	Index diff.	Mean	Index diff.	Index diff.	Index diff.
Iceland	-0.22	0.113	0.430	0.043	0.10	0.139	-0.170	-0.326
Ireland	-0.07	0.173	0.526	0.249	-0.04	0.131	-0.140	0.104
Israel	0.09	0.266	0.466	-0.001	0.17	0.114	0.170	-0.130
Italy	0.09	0.274	0.841	-0.098	-0.03	0.210	-0.070	-0.129
Japan	0.30	0.094	0.210		-0.61	0.123	-0.032	
Latvia	0.02	0.023	0.610	0.142	-0.19	-0.063	0.002	0.013
Lithuania	-0.11	0.158	0.644	0.039	0.23	0.051	0.176	-0.318
Luxembourg	-0.24	0.224	0.620	0.105	-0.01	0.234	-0.053	-0.035
Mexico	0.35	0.136	0.477	-0.059	0.36	0.136	-0.002	-0.184
Netherlands	-0.57	0.234	0.659	0.221	-0.11	0.119	-0.173	0.260
New Zealand	-0.08	0.175	0.492	0.209	-0.02	0.147	-0.041	0.142
Norway	-0.51	0.095	0.582	0.335	-0.11	0.142		
Poland	0.18	0.119	0.699		-0.06	0.013	-0.097	
Portugal	0.08	0.186	0.744	0.036	-0.01		-0.110	-0.044
Korea	0.23	0.295	0.156		-0.04	0.143	-0.244	
Slovak Republic	0.11	0.298	0.783	-0.198	-0.28	0.136	-0.081	0.054
Slovenia	-0.22	0.236	0.665	-0.037	-0.05	0.079	-0.209	0.021
Spain	0.08	0.078	0.729	0.085	0.17	0.11	-0.063	-0.071
Sweden	-0.31	0.163	0.420	0.285	-0.06	0.038	-0.192	0.188
Switzerland	-0.32	0.226	0.678	-0.023	0.02	0.104	-0.065	0.048
Turkey	0.68	0.249	0.757	-0.130	0.36	0.182	0.183	-0.123
United Kingdom	-0.21	0.013	0.492	0.342	-0.17	0.044	-0.271	0.214
United States	-0.07	0.123	0.510	0.080	0.17	0.035	-0.033	-0.091

Note: Diff.= difference. A blue shading indicates that the value of a specific indicator in a country is statistically significant above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold. All indices are standardised to have a mean of 0 and a standard deviation of 1 across OECD countries so that a difference of, for example, 0.5 on an index corresponds to a difference of 50% of a standard deviation. Differences smaller than 0.3 are considered small, differences between 0.3 and 0.5 are considered large, and differences over 0.5 are considered very large.

1. High parental education refers to students with at least one parent who obtained tertiary qualifications. Low parental education refers to students whose parents did not obtain tertiary degrees.

Source: OECD (2018_[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/twcxs6>

Given the crucial role of learning attitudes in promoting effective learning and academic achievement it is important for governments and education policy makers to identify which policies can maximise the benefits of learning, particularly of distant and remote learning. Policies aiming to increase the support provided to young learners by their families and teachers bear the greatest promise of success.

Among the factors shaping the formation of lifelong learning attitudes, teachers and the practices they adopt appear particularly effective. Other things being equal, students who perceive their teachers as more supportive of their learning tend to display better attitudes towards learning than those who receive less support from their teachers. In particular, specific pedagogies or behaviours – such as teachers' enthusiasm for the content of instruction, their interactions with pupils during the lessons and their practice

of stimulating their critical ability – can help develop students *learning goals, motivation to master tasks, self-efficacy and enjoyment of reading*.

Table 1.2 illustrates the variation across education systems and schools with different characteristics in the proportion of children near the end of their compulsory studies in 2018 whose teachers displayed a high level of enthusiasm and put in place pedagogical approaches to stimulate their reading habits. On average, students in schools with an advantaged socio-economic composition reported that their teachers had greater levels of enthusiasm compared to those attending schools with a socio-economically disadvantaged composition, a difference corresponding to 10% of a standard deviation. Similarly, in many countries, teachers in private schools expressed greater enthusiasm than teachers in public schools.

Table 1.2. Snapshot of teacher practices at the secondary-school level

	Index of teacher enthusiasm				Index of teacher stimulation of reading			
	Mean Index	Top vs. bottom quartile of school-level socio-economic status	Private vs. public school	School located in rural vs. urban community	Mean index	Top vs. bottom quartile of school-level socio-economic status	Private vs. public school	School located in rural vs. urban community
	Mean index	Index diff.	Index diff.	Index diff.	Mean index	Index diff.	Index diff.	Index diff.
OECD average	0.012	0.118	0.148	0.052	-0.003	0.09	0.117	0.00
EU average	-0.054	0.123	0.144	0.070	-0.024	0.11	0.119	0.00
Australia	0.199	0.257	0.188	-0.105	0.176	0.24	0.112	-0.07
Austria	-0.090	0.009	-0.019	0.088	-0.147	0.04	0.040	-0.07
Belgium	0.045	-0.003			-0.169	-0.06		
Canada					0.216	0.07	-0.005	-0.08
Chile	0.321	0.084	0.080	0.064	0.274	-0.05	0.075	0.15
Czech Republic	-0.307	0.344	0.119	-0.030	-0.239	0.29	0.217	-0.18
Denmark	0.188	0.130	0.097	0.032	0.125	0.19	0.186	0.01
Estonia	-0.083	0.180	0.401	0.065	-0.110	0.10	0.292	-0.06
Finland	-0.147	0.207	0.254	0.111	-0.200	0.20	0.207	-0.06
France	0.029				-0.047			
Germany	-0.117	0.125	0.083		-0.085	-0.03	-0.008	
Greece	-0.225	0.018	0.355	0.134	0.019	0.10	0.330	0.00
Hungary	-0.030	0.222	0.062	-0.065	0.075	0.34	0.056	-0.04
Iceland	0.050	0.286		-0.096	-0.169	0.14		-0.07
Ireland	0.136	0.132	0.028	0.070	0.064	0.09	0.040	0.07
Israel	-0.080	-0.284		0.007	-0.099	-0.15		-0.06
Italy	-0.072	0.145	0.134	0.376	-0.209	0.07	0.137	0.35
Japan	-0.236	0.181	-0.010		0.127	0.19	-0.088	
Latvia	-0.195	0.049	0.237	0.004	0.092	0.09	-0.011	-0.11
Lithuania	-0.076	0.096	0.137	0.020	0.230	0.22	0.263	-0.03
Luxembourg	-0.158	0.204	0.173		-0.075	0.10	0.061	
Mexico	0.263	-0.104	0.033	0.164	0.087	-0.21	0.013	0.22
Netherlands	-0.183	0.278	0.001		-0.386	0.14	-0.037	
New Zealand	0.229	0.258	0.164	-0.063	0.158	0.15	0.164	-0.14
Norway	0.087	0.122			-0.220	0.19		
Poland	-0.240	0.000	0.055	0.187	0.109	0.03	0.164	0.11
Portugal	0.103	0.018	0.331	0.237	0.118	-0.09	0.229	0.11
Korea	0.437	0.164	0.067		0.344	0.04	0.001	

	Index of teacher enthusiasm				Index of teacher stimulation of reading			
	Mean Index	Top vs. bottom quartile of school-level socio-economic status	Private vs. public school	School located in rural vs. urban community	Mean index	Top vs. bottom quartile of school-level socio-economic status	Private vs. public school	School located in rural vs. urban community
	Mean index	Index diff.	Index diff.	Index diff.	Mean index	Index diff.	Index diff.	Index diff.
Slovak Republic	-0.270	0.012	-0.119	0.110	-0.089	0.12	-0.074	0.02
Slovenia	-0.104	0.222	0.489	0.156	-0.082	0.30	0.326	0.18
Spain	0.034	0.036	0.143	0.123	-0.309	-0.06	0.081	0.03
Sweden	0.011	0.155	0.154		-0.064	0.09	0.115	
Switzerland	0.106	0.118	0.191	-0.060	-0.021	0.15	0.267	-0.01
Turkey	-0.098	-0.018	0.141		0.073	0.10	0.158	
United Kingdom	0.231	0.122	0.085	-0.021	0.149	0.03	0.069	-0.12
United States	0.246	0.248	0.520	0.000	0.204	0.26	0.435	-0.23

Note: Diff.= difference. A blue shading indicates that the value of a specific indicator in a country is statistically significant above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold. All indices are standardised to have a mean of 0 and a standard deviation of 1 across OECD countries so that a difference of, for example, 0.5 on an index corresponds to a difference of 50% of a standard deviation. Differences smaller than 0.3 are considered small, differences between 0.3 and 0.5 are considered large and differences over 0.5 are considered very large.

Source: OECD (2018^[15]), PISA database 2018, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/i420of>

Table 1.3. Snapshot of parental emotional support for 15-year-old students

	Index of parental emotional support			
	Mean index	High vs. low parental education ¹	Girls vs. boys	Students with an immigrant background vs. students without an immigrant background ²
	Mean	Index diff.	Index diff.	Index diff.
OECD average	0.00	0.139	0.134	-0.132
EU average	-0.04	0.133	0.168	-0.158
Australia	0.14	0.191	0.129	0.001
Austria	0.15	0.113	0.227	-0.088
Belgium	-0.03	0.128	0.153	0.003
Canada				
Chile	0.06	0.051	0.045	-0.047
Czech Republic	-0.33	0.090	0.030	-0.413
Denmark	0.12	0.249	0.158	-0.123
Estonia	-0.20	0.173	0.107	-0.296
Finland	-0.05	0.173	0.088	-0.135
France	0.05	0.074	0.095	-0.057
Germany	0.08	0.164	0.217	-0.167
Greece	-0.04	0.117	0.242	-0.246
Hungary	0.00	0.134	0.084	0.218

	Index of parental emotional support			
	Mean index	High vs. low parental education ¹	Girls vs. boys	Students with an immigrant background vs. students without an immigrant background ²
	Mean	Index diff.	Index diff.	Index diff.
Iceland	0.32	0.190	0.109	-0.528
Ireland	0.18	0.097	0.252	-0.137
Israel				
Italy	-0.17	0.061	0.183	-0.294
Japan	-0.26	0.090	0.285	
Latvia	-0.31	0.229	0.070	-0.033
Lithuania	0.04	0.199	0.268	-0.524
Luxembourg	-0.06	0.144	0.120	-0.224
Mexico	0.07	0.160	0.119	-0.040
Netherlands	0.09	0.124	0.126	-0.040
New Zealand	0.18	0.163	0.133	-0.039
Norway	0.17	0.264	0.128	-0.199
Poland	-0.36	0.180	0.054	
Portugal	0.25	0.158	0.127	-0.156
Korea	0.09	0.212	-0.016	
Slovak Republic	-0.26	0.101	0.180	-0.007
Slovenia	-0.03	0.085	0.224	-0.204
Spain	0.04	0.159	0.195	-0.214
Sweden	-0.01	0.153	0.131	-0.004
Switzerland	0.13	0.107	0.171	-0.211
Turkey	0.02	0.095	0.290	-0.172
United Kingdom	0.07	0.119	0.020	-0.094
United States	0.08	0.164	0.047	-0.122

Note: Diff.= difference. A blue shading indicates that the value of a specific indicator in a country is statistically significant above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold. Data refer to 15-year-old students surveyed in the PISA study conducted in 2018. All indices are standardised to have a mean of 0 and a standard deviation of 1 across OECD countries so that a difference of, for example, 0.5 on an index corresponds to a difference of 50% of a standard deviation. Differences smaller than 0.3 are considered small, differences between 0.3 and 0.5 are considered large, and differences over 0.5 are considered very large.

1. High parental education refers to students with at least one parent who obtained tertiary-level qualifications. Low parental education refers to students whose parents did not obtain tertiary degrees.

2. Students with an immigrant background are students who were born outside the country in which they sat the PISA test in 2018, or whose parents were born outside the country.

Source: OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/h6mnu7>

Teachers' ability to influence the development of students' learning attitudes is related to the support they receive from schools and more broadly, education systems. For example, providing teachers with continuous training or professional development – especially if integrated into their workday – and encouraging collaborative environments with their colleagues can promote effective teaching practices.

Together with teachers, families play a key role in furthering children's lifelong learning attitudes. When parents provide emotional support to their children through behaviours that support their efforts and enhance their confidence, these children are more likely to internalise strong lifelong learning attitudes.

Additionally, students whose parents engage in social and political discussions, and spend time talking to them, are more likely to develop stronger learning attitudes than peers whose parents are less involved. Table 1.3 shows considerable variations among countries in parents' readiness to provide emotional support to their children. It reveals that socio-economically disadvantaged parents, and parents with immigrant backgrounds, may experience barriers to doing so effectively, reducing their children's readiness to learn throughout life. For example, on average across OECD countries 15-year-old students with at least one parent who had tertiary degrees were more likely to report receiving emotional support from their parents than students whose parents did not have tertiary degrees – a difference corresponding to around 15% of a standard deviation, but as high as 25% of a standard deviation in Norway.

Obstacles to effective parental engagement with their children's learning include lack of awareness of its importance, lack of knowledge and information on how parents can effectively engage, and lack of time to do so. Increasing parental participation, both in the earlier stages of a child's education and in adolescence, requires interventions that act on parental role construction, and strengthen links and communications between schools and parents. When schools organise initiatives that inform parents on practices they can embrace to support their children's learning, parental involvement increases. Providing lifelong learning opportunities to parents is also key to improving outcomes for the next generation.

During the pandemic, when parental support became crucial to enable many children to remain engaged with remote learning, many parents struggled to provide such support because of competing demands on their time, as well as stress induced by the health situation and the restrictions enforced to reduce the spread of COVID-19. Many governments have put in place interventions to ease the tension facing parents and children, such as introducing or extending leave opportunities for family reasons (OECD, 2020^[16]). Complementary efforts include providing information to help families and youngsters remain engaged with education and learning, instituting programmes to distribute hardware and establish connectivity so that children can access online learning, and creating dedicated platforms to help parents support their children's learning.

Although the pandemic and the associated reductions in face-to-face learning have led many children to experience lower-than-expected development of academic skills and knowledge, the greatest long-term risk is that the current generation of students may fail to develop the learning attitudes that sustain lifelong learning. With the right support, compensating for the lack of progress induced by disrupted schooling is possible – but not without a firm belief in the value of learning and a strong motivation to learn, underpinned by a mindset that welcomes learning in different forms and different settings.

In the short term, the pandemic could lead to increases in early school leavers and dropout rates. In the medium and long term, it could lead to lower engagement with learning throughout life, precisely at a time when all actors are called upon to step up efforts to ensure deep engagement with lifelong learning in order to weather the structural changes induced by the pandemic.

Beyond schooling: Promoting effective transitions into further education, training and the labour market

The early years represent a crucial period for developing foundation skills and attitudes that sustain lifelong learning. Although children already display differences in aptitude and attitudes, school systems are designed to guarantee that all children receive broadly similar educational experiences, although systems may differ in the amount and timing of the differentiation introduced.

The years marking the transition between adolescence and early adulthood represent an important period of rapid and profound changes. These include not only children's biological changes, but also important changes in the opportunities available to individuals and their agency over the direction of their learning trajectories. While biological changes are universal, agency acquisition differs vastly depending on a country's social and institutional features. These often interact with the educational, social, economic and

cultural capital on which individuals can rely because of their family background. From the teenage years onwards, opportunities for skill development become highly differentiated: individuals can choose for the first time to pursue various forms of education and training, or to engage in informal and non-formal learning opportunities in the workplace. The extent to which differentiation shapes individuals' lifelong learning trajectories can vary markedly across countries and groups of individuals within each country.

Individuals' experiences during this period can set them on divergent trajectories in their work, social and personal life, leading them to acquire key skills and consolidate lifelong learning habits. The pandemic has caused major disruptions in the provision of higher education and vocational education programmes, training courses and internships. It has also caused reductions in new labour market opportunities and disruptions in work patterns, with a shift to remote working or physically distanced work. Such disruptions may have pervasive long-term effects on youngsters, by shaping the opportunities available to them in the years immediately following the end of compulsory schooling. Identifying which groups may be especially vulnerable, and what factors reduce vulnerability, can help design policies that support vulnerable youngsters as the pandemic unfolds, and in the years to come.

The lack of harmonised longitudinal cross-country evidence prevents a detailed assessment of the manner in which skills – including information-processing skills and socio-emotional and motivational skills – previously evolved during the transition from the teenage years into young adulthood. However, it is possible to identify changes in achievement at the population level for similar birth cohorts. Table 1.4 shows that during the transition from the end of compulsory schooling (age 15) to young adulthood (age 27), literacy achievement for the birth cohort of individuals born in 1984/85 in OECD countries grew on average by around 30% of a standard deviation. Literacy achievement grew the most in Belgium, the Czech Republic, Germany, Israel, Japan and Poland. Within countries, literacy achievement grew more for the 1984/85 birth cohort among low achievers and individuals with tertiary-educated parents.

Table 1.4. Snapshot of achievement growth between age 15 and age 27

	Literacy levels		Literacy achievement growth				
	Age 15 (PISA 2000/03)	Age 26-28 (PIAAC 2012/15)	Mean	10 th percentile	90 th percentile	Low parental education ¹	High parental education ¹
	Mean score	Mean score	Score point diff.	Score point diff.	Score point diff.	Score point diff.	Score point diff.
OECD average	268	282	13.5	14.56	11.90	9.54	14.18
EU average	268	282	13.9	14.46	11.66	10.89	15.41
Australia	280	288	7.8	13.17	6.56	8.65	6.12
Austria	270	282	11.8	13.72	10.23	9.32	11.55
Belgium*	270	294	24.3	41.61	13.79	15.82	33.63
Canada	283	286	3.2	2.96	5.51	3.29	7.07
Chile	224	233	9.7	5.57	20.15	9.67	3.71
Czech Republic	263	285	22.7	23.81	12.30	22.87	21.69
Germany	259	284	25.2	35.07	13.45	23.94	11.93
Denmark	265	285	20.1	11.27	19.04	14.67	21.73
Spain	263	263	-0.6	-7.14	3.15	-1.98	4.77
Finland	289	307	18.1	21.53	20.61	17.95	18.62
France	269	279	10.4	3.79	11.11	10.21	13.92
United Kingdom*	278	281	3.6	-5.84	4.49	4.05	5.85
Greece**	254	251	-3.1	4.26	-4.83	-0.81	2.78
Ireland	279	276	-3.3	-4.94	-2.37	-5.75	-1.05
Israel	244	271	27.0	29.20	25.57	29.02	16.19
Italy	261	265	4.2	5.77	2.21	4.22	16.13
Japan	277	310	32.6	47.32	23.16		27.57
Korea	278	294	15.6	20.26	16.07	16.38	14.32

	Literacy levels		Literacy achievement growth				
	Age 15 (PISA 2000/03)	Age 26-28 (PIAAC 2012/15)	Mean	10 th percentile	90 th percentile	Low parental education ¹	High parental education ¹
	Mean score	Mean score	Score point diff.	Score point diff.	Score point diff.	Score point diff.	Score point diff.
Netherlands	282	299	17.6	14.15	20.13	12.40	20.93
Norway	269	288	19.0	14.76	13.57	7.84	25.47
New Zealand	280	285	5.0	12.41	-0.94	-5.20	6.10
Poland	257	281	24.6	28.50	22.91	23.83	17.47
Sweden	274	292	17.1	10.73	19.65	8.78	21.70
United States	269	280	11.3	7.42	9.99	-0.15	12.10

Note: Diff.= difference. Mean score expressed in PIAAC points. PIAAC= Programme for the International Assessment of Adult Competencies. A blue shading indicates that the value of a specific indicator in a country is statistically significant above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold. Data in the first column refer to 15-year-old students surveyed in the PISA study conducted in 2000 or 2003 in Chile, and Greece. Data in the second column refer to the cohort of individuals who were part of the PISA target population in 2000 or 2003 and were part of the PIAAC target population at age 26-28 in the PIAAC study. Data in the third column illustrate the change in PIAAC scores between age 15 and 26-28. Data in the fourth column refer to achievement growth among the lowest achieving 10% in each of the two studies. Data in the fifth column refer to achievement growth among the highest achieving 10% in each of the two studies. Data in the sixth column illustrate the change in PIAAC scores between age 15 and 26-28 among individuals whose parents did not obtain tertiary qualifications. Data in the seventh column illustrate the change in PIAAC scores between age 15 and 26-28 among individuals whose parents obtained tertiary qualifications. PISA reading scores are expressed in PIAAC literacy scores following (Borgonovi et al., 2017^[17]). In PISA 2000, the United Kingdom and the Netherlands fell short of the minimum response rate requirements. Information provided by the United Kingdom led to the assessment that response bias was likely negligible. No similar information was provided by the Netherlands.

1. High parental education refers to students with at least one parent who obtained tertiary-level qualifications. Low parental education refers to students whose parents did not obtain tertiary degrees.

*PIAAC data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland jointly. The relevant estimated mean PIAAC score for Flemish community of Belgium in PISA 2000 is 282 and the PIAAC score difference between 15 and 27-year-olds corresponds to 12 points. The 10th percentile difference when achievement growth is calculated only considering 15-year-olds in the Flemish community of Belgium corresponds to 1 point, the 90th percentile difference corresponds to 8 points, the difference between individuals with low parental education corresponds to 4 points and the difference between individuals with high parental education corresponds to 25 points.

**The data for Greece include a large number of cases (1 032) in which there are responses to the background questionnaire but where responses to the assessment are missing. Proficiency scores have been estimated for these respondents based on their responses to the background questionnaire and the population model used to estimate plausible values for responses missing by design derived from the remaining 3 893 cases.

Source: OECD (2000^[18]), *PISA database 2000*; <https://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2012^[19]), (2015^[20]), *Survey of Adult Skills (PIAAC) databases*; <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

StatLink  <https://stat.link/nzou18>

Public policies can ensure that the years between the end of compulsory schooling and reaching established tenure in the labour market are accompanied by rapid skill development for all. Ensuring that youngsters do not leave education without engaging in training or the labour market, and that those who leave re-engage promptly should be a priority. At the system level, differences in overall achievement are more related to the share of individuals not in education, employment or training (NEET) than to any other factor, including the share of individuals who participate in higher education programmes. Furthermore, reductions in NEET rates are associated with reduced disparities in achievement at the population level and lower intergenerational transmission of educational advantages.

Providing high-quality orientation programmes to school-aged children is a first step to reduce NEET rates and help individuals, irrespective of their background, navigate the transition between compulsory schooling and adulthood. Children can acquire information about further education and the labour market

through various means, including experience-based initiatives such as job-shadowing programmes. Creating stronger connections between schools and the labour market could be especially important following the pandemic, not only to reduce the number of school leavers who will become NEET, but also to ensure that youngsters understand the changing requirements of today's workplaces. Yet Table 1.5 suggests that participation in orientation programmes, especially internships, remains limited in many countries.

Table 1.5 further reveals that even before the pandemic hit, many youngsters – especially from socio-economically disadvantaged households – did not intend to continue formal education beyond the end of compulsory schooling, partly because of financial considerations and partly because they did not believe they needed further qualifications in their intended occupation. Furthermore, many expected to work in professions that were projected to require fewer workers because of technological innovations.

By changing how higher education and formal courses are delivered, creating greater financial constraints for families and increasing uncertainty, the pandemic is posing a severe risk of producing a lost generation with poor transition years. Many youngsters, particularly from socio-economically disadvantaged households, may drop out of education. Vocational education and training provision has also been disrupted, and labour-market contractions have decreased opportunities for skill development at work.

Table 1.5. Snapshot of educational orientation and youngsters' perspectives

	Percentage of 15-year-olds doing an internship ¹		Percentage of 15-year-olds who expect to be working in 5 years ²		Percentage of 15-year-olds who expect to be studying in 5 years ³		Percentage of 15-year-olds who expect to work an occupation that is expected to shrink by 2029 ⁴	
	Overall population	High vs. low parental education ⁵ Percentage point diff.	Overall population	High vs. low parental education ¹ Percentage point diff.	Overall population	High vs. low parental education ¹ Percentage point diff.	Overall population	High vs. low parental education ¹ Percentage point diff.
OECD average	34	-0.3	14	-5.5	15	12.2	25	-4.4
EU average	35	-0.5	14	-6.1	17	11.6	27	-5.9
Australia	49	0.6	14	-6.3	12	17.1	26	-3.3
Austria	46	-1.1	17	-5.9	16	9.8	31	-6.1
Belgium*	10	2.9	12	-8.4	25	12.1	29	-5.2
Canada							17	-5.5
Chile							17	-5.4
Czech Republic							31	-7.1
Germany	87	-3.7					31	-4.2
Denmark	56	1.2	7	-3.5	17	2.7	27	-5.4
Spain	22	2.3	12	-6.4	13	14.9	23	-4.4
Finland							20	-6.0
France							29	-2.9
United Kingdom*	25	1.7	12	-3.2	13	11.9	20	-1.8
Greece*	39	1.6	12	-4.4	12	8.0	17	-3.7
Ireland	39	0.6	11	-3.0	13	17.4	25	-3.2
Israel	34	2.4	14	-1.5	20	9.1	18	-2.2
Italy	21	3.2	13	-2.3	11	6.3	24	-3.7
Japan		0.0					43	1.8
Korea	9	0.1	14	-5.8	5	11.5	29	-1.9
Netherlands		0.0					24	-6.6
Norway		0.0					21	-5.1
New Zealand	29	-1.0	12	-4.0	15	17.0	20	-1.6

	Percentage of 15-year-olds doing an internship ¹		Percentage of 15-year-olds who expect to be working in 5 years ²		Percentage of 15-year-olds who expect to be studying in 5 years ³		Percentage of 15-year-olds who expect to work an occupation that is expected to shrink by 2029 ⁴	
	Overall population	High vs. low parental education ⁵	Overall population	High vs. low parental education ¹	Overall population	High vs. low parental education ¹	Overall population	High vs. low parental education ¹
		Percentage point diff.		Percentage point diff.		Percentage point diff.		Percentage point diff.
Poland	15	-1.4	14	-11.0	17	19.6	26	-12.5
Sweden		0.0					34	-6.3
United States		0.0					19	-1.3

Note: A blue shading indicates that the value of a specific indicator in a country is statistically significantly above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold. Data refer to 15-year-old students surveyed in the PISA study conducted in 2018. Data are available only for countries that administered the optional Educational Career Questionnaire.

1. Refers to the percentage of students who answered yes to the following question: "Have you done an internship to find out about future study or types of work?"

2. Refers to the percentage of students who indicated they expect to work in five years because the occupation they want does not require a degree or because they need to be financially independent.

3. Refers to the percentage of students who indicated they expect to study in five years because the occupation they want requires a degree.

4. Refers to the percentage of students who indicated that by age 30, they expect to work in an occupation that is projected to shrink by the U.S. Bureau of Labor.

5. Low parental education refers to 15-year-old students who reported that neither of their parents achieved a tertiary-level qualification. High parental education refers to 15-year-old students who reported that at least one parent had achieved a tertiary degree.

*For Belgium, Greece, and the United Kingdom, see notes under Table 1.4.

Source: OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/js6wr2>

Raising aspirations to learn: Engaging adults in learning

As previously noted, engagement in adult learning can bolster the acquisition of both foundation skills, as well as new skills and knowledge that will help individuals remain engaged in the labour market and society despite technological and social transformations. Many businesses restructured their operations during the pandemic, requiring many workers to undergo rapid upskilling and reskilling. However, Table 1.6 indicates that already before the pandemic, many workers did not participate in adult learning at work. One in two adults on average in OECD countries had already disengaged from adult learning reported being unwilling to participate in available learning opportunities. Around one in ten individuals were inactive but motivated, i.e. did not participate but expressed a desire to engage in available learning. Around 15% of adults in OECD countries were active and seeking additional learning, i.e. expressed an interest in increasing their participation in adult learning. Finally, one in four individuals had already participated in adult learning, but did not seek to engage in additional learning opportunities.

Table 1.6. Snapshot of participation in adult learning

	Overall population	Percentage of disengaged			
		High vs. low education ¹	Mature vs. prime-age workers ²	Females vs. males	High vs. low parental education ³
		Percentage point diff.	Percentage point diff.	Percentage point diff.	Percentage point diff.
OECD average	50	-27	15	2	-19
EU average	53	-28	15	0	-20
Australia	42	-29	15	2	-18
Austria	51	-22	18	2	-14
Belgium*	54	-29	19	3	-22
Canada	39	-21	18	1	-16
Chile	44	-30	19	7	-20
Czech Republic	52	-21	15	7	-12
Germany	45	-27	13	6	-19
Denmark	32	-24	19	-4	-16
Spain	49	-31	16	-1	-22
Estonia	43	-25	16	-8	-15
Finland	35	-25	19	-5	-15
France	59	-26	15	0	-20
United Kingdom*	42	-21	10	3	-17
Greece*	76	-29	14	0	-29
Hungary	62	-29	13	0	-21
Ireland	42	-28	14	3	-18
Israel	47	-28	11	-2	-19
Italy	70	-36	11	1	-31
Japan	57	-25	11	11	-16
Korea	44	-26	16	4	-15
Lithuania	66	-42	14	-6	-25
Mexico	63	-34	15	4	-28
Netherlands	40	-23	17	7	-17
Norway	36	-21	19	-1	-13
New Zealand	28	-14	11	0	-9
Poland	67	-39	19	1	-28
Slovak Republic	67	-32	10	3	-25
Slovenia	55	-32	17	-3	-24
Sweden	35	-19	13	-3	-13
Turkey	79	-35	14	14	-32
United States	36	-24	12	0	-15

Note: Diff.=difference. A blue shading indicates that the value of a specific indicator in a country is statistically significant above the relevant estimate for the OECD average (difference significant at the 5% level). A grey shading indicates that the value of a specific indicator in a country is statistically significant below the relevant estimate for the OECD average (difference significant at the 5% level). A white shading indicates that the value of a specific indicator in a country is not statistically significant different from the relevant estimate for the OECD average (the difference is not significant at the 5% level). Purple indicates that no data are available for a specific indicator. Differences across groups that are statistically significant at the 5% level are denoted in bold.


1. High education refers to workers who obtained tertiary- level qualifications. Low education refers to workers who did not obtain tertiary degrees.

2. Mature workers are workers between the ages of 55 and 65. Prime workers are workers between the ages of 25 and 35.

3. High parental education refers to workers with at least one parent who obtained tertiary-level qualifications. Low parental education refers to workers whose parents did not obtain tertiary degrees.

*For Belgium, Greece, and the United Kingdom, see notes under Table 1.4.

Source: OECD (2012^[19]), (2015^[20]), Survey of Adult Skills (PIAAC) databases, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

StatLink  <https://stat.link/dqe3fo>

Educational attainment was one of the strongest predictors of individuals' willingness to participate in available learning opportunities. Across the OECD, tertiary-educated adults were on average 50% less likely to be disengaged from adult learning than workers with lower-secondary education or below. The pandemic hit these workers most: containment and mitigation strategies put in place to reduce transmission of the Sars-CoV-2 virus have had considerable direct and indirect effects on the availability of learning opportunities for adult workers who were participating, or interested in participating, in learning. Firms' reliance on remote working arrangements to reduce social interaction meant that many workers had fewer opportunities to engage in formal, non-formal and informal learning activities, unless these could take place remotely. Even then, creating meaningful opportunities to engage in learning remained challenging for workers with limited digital skills or competing time pressures, such as parents with young children. As a result, some workers might have involuntarily disengaged from lifelong learning.

In the global effort to limit the spread of the coronavirus and minimise its death toll, most governments introduced radical social distancing measures that partly or completely reduced workers' physical presence in the workplace. Table 1.7 shows that under several assumptions, COVID-19-induced shutdowns of economic activities decreased workers' participation in non-formal learning by on average 18%, and in informal learning by 25%. Before the pandemic, workers across OECD countries spent on average 4.9 hours per week on informal learning and 0.7 hours on non-formal learning. According to estimates, during the pandemic that time dropped to 3.7 hours for informal learning and 0.6 hours per week for non-formal learning. This represents a notable amount of lost learning, which may not be easily recovered. These estimates consider the partial transfer of some learning activities on line. The specific impact of the pandemic on adult learning depends on the number of informal and non-formal learning hours workers engaged in beforehand, the extent to which economic activities were affected by mitigation and containment strategies, and the feasibility of working (and learning) remotely in different countries and sectors.

Individuals' participation in adult learning is not only contingent on their willingness and the barriers they face through personal circumstances, but also on the availability of learning opportunities and incentives to participate. These, in turn, depend on their job and employer characteristics, including the type of employment contract, the risk of job automation, the level of experience required to fulfil expectations, the size and growth pattern of their firm, and the use (or not) of high-performance work practices and performance-based pay schemes. This means that the work context, and the demand for skills and knowledge, are crucial factors that need to be understood if individuals are to remain engaged in lifelong learning. Moreover, labour-market demands can guide not only participation, but also its content and objective.

Table 1.7. Snapshot of participation in informal and non-formal learning, pre- and post-COVID-19

	Informal learning – average number of hours per week, per worker			Non-formal learning – average number of hours per week, per worker		
	Pre-COVID-19	Widespread shutdown scenario	Limited shutdown scenario	Pre-COVID-19	Widespread shutdown scenario	Limited shutdown scenario
OECD average	4.9	3.7	4.1	0.7	0.6	0.6
EU average	4.8	3.7	4.0	0.6	0.5	0.6
Australia	6.1	4.7	5.2	0.9	0.7	0.8
Austria	4.6	3.5	3.8	0.7	0.6	0.6
Belgium*	4.7	3.8	4.1	0.6	0.5	0.5
Canada	6.0	4.6	5.0	0.9	0.8	0.8
Chile	5.4	3.7	4.3	0.5	0.4	0.5
Czech Republic	4.3	3.2	3.5	0.6	0.5	0.5
Denmark	5.4	4.4	4.7	1.1	0.9	1.0
United Kingdom*	4.9	3.8	4.2	0.8	0.7	0.7
Estonia	5.4	4.0	4.4	0.6	0.5	0.5
Finland	5.7	4.5	4.9	0.8	0.7	0.7
France	5.6	4.3	4.7	0.3	0.3	0.3
Germany	4.4	3.4	3.7	0.8	0.7	0.7
Greece*	3.9	2.8	3.1	0.3	0.3	0.3
Hungary	3.5	2.6	2.9	0.5	0.4	0.4
Ireland	4.9	3.8	4.2	0.8	0.7	0.7
Israel	5.1	4.0	4.3	0.8	0.7	0.7
Italy	4.1	3.1	3.4	0.4	0.3	0.3
Japan	4.2	3.1	3.4	0.6	0.5	0.5
Lithuania	2.8	2.1	2.3	0.4	0.4	0.4
Mexico	5.4	3.3	3.9	0.6	0.4	0.5
Netherlands	4.4	3.5	3.8	1.0	0.8	0.9
New Zealand	5.5	4.3	4.7	1.1	0.9	1.0
Norway	5.8	4.7	5.1	0.0	0.0	0.0
Poland	4.4	3.1	3.5	0.4	0.4	0.4
Korea	2.6	1.7	2.0	1.1	0.8	0.9
Slovak Republic	5.0	3.7	4.0	0.4	0.3	0.3
Slovenia	6.6	4.8	5.4	0.5	0.4	0.5
Spain	6.4	4.6	5.1	0.9	0.8	0.8
Sweden	5.6	4.6	4.9	0.9	0.7	0.8
Turkey	3.4	2.3	2.6	0.4	0.3	0.3
United States	6.4	4.8	5.2	1.2	1.0	1.1

Note: Details on the estimation of learning per week per working pre-COVID and under the widespread/limited scenario are available in OECD (2021^[21]), “Adult Learning and COVID-19: How much informal and non-formal learning are workers missing?”, <https://doi.org/10.1787/56a96569-en>.

*For Belgium, Greece, and the United Kingdom, see notes under Table 1.4.

Source: Author's calculations, based on OECD (2021^[21]), “Adult Learning and COVID-19: How much informal and non-formal learning are workers missing?”, <https://doi.org/10.1787/56a96569-en>.

StatLink  <https://stat.link/i859wf>

Skills for a lifetime? The role of transversal skills in helping individuals thrive in the labour market

Developing strong and positive lifelong learning attitudes early in life, and continuing to invest in skill development in adulthood, is key to navigating the rapid transformations of societies and labour markets. Digitalisation and automation are reshaping the way work is performed, and the way individuals acquire and use work-related skills. As economies evolve and new technologies are introduced in the productive process, developing and maintaining relevant skills is becoming crucial for workers to remain in the labour market in high-quality jobs.

The pandemic has highlighted the importance of building skill sets that bolster individuals' resilience to unforeseen shocks and structural changes. With the pandemic still raging, lifelong learning policies should seek to balance the need for rapid solutions to the emergency while also proposing long-lasting interventions to address more structural challenges, such as the impact of digitalisation and automation on jobs. In such a fast-evolving context, workers would benefit greatly from developing transversal skills, which are “not specifically related to a particular job, task, academic discipline or area of knowledge and ... can be used in a wide variety of situations and work settings” (UNESCO, 2013^[22]). Many workers will need to switch occupations and reinvent themselves to avoid or reduce adverse shocks permeating the labour market, but also adapt to long-term changes in jobs and skill demands.

Evidence from online job-vacancy data reveals that communication, teamwork and organisational skills are the most requested transversal skills across job openings. Cognitive skills, such as analytical, problem solving, leadership and presentation skills, were also considered highly transversal across a variety of jobs and work contexts. Digital skills were equally transversal, confirming the extensive penetration of tasks involving digital technologies across jobs in virtually all sectors.

Analyses further reveal that high-level cognitive skills, such as analytical skills, are key to increasing employability and securing a high-paying job. Leadership and decision-making skills also appear to be highly associated with higher wages, but are generally more relevant in occupations with fewer job openings, including managerial positions. By contrast, basic customer service or clerical skills are relevant in occupations with frequent job openings and are therefore deemed to increase employability, although they are associated with lower-wage jobs. Finally, organisational, teamwork and communication skills are not associated with positive wage or employment returns.

The acquisition of transversal skills requires interactive learning. Constructivist learning theories suggest that learning through authentic activities, as opposed to solely through instruction, facilitates active learning and developing key competences. Spurring such involvement can be challenging, but educational programmes at all levels should consider – and, wherever possible, reflect – real-life applications. Collaborative learning (e.g. project-based and problem-based learning approaches) allows learners to work together in small groups to achieve a common objective, and can help them develop several transversal skills simultaneously.

The pandemic has caused major disruptions to labour markets worldwide. In the short term, the resulting uncertainty, fear of infection, and policies leading to the suspension or closure of businesses have caused large contractions in economic activity. As a result, millions of workers have experienced a sudden reduction in, or complete loss of, their livelihoods. Crucially, entry into the labour market has been delayed for those seeking employment for the first time, with potentially lasting effects on their labour-market prospects.

This unprecedented drop in economic activity is reflected in the 40% decrease in new job vacancies posted on line by early May 2020. Over May-July 2020, the situation had improved in several countries, leading to a slight increase in the number of new jobs published on line relative to previous months. Many low-paid and often low-educated workers were particularly affected by declining job openings for occupations they

typically filled before the COVID-19 crisis. On average, at the peak of the first wave of infections (March-April 2020), the volume of new job advertisements posted on line seeking workers with a secondary education had declined more than the volume of jobs for individuals with post-secondary or tertiary education, although the situation changed as the pandemic progressed. At the same time, the number of job postings requiring individuals to work from home increased sharply during the pandemic, clearly indicating the need for workers with digital skills and internet connectivity. However, the total volume of online job advertisements remains lower than in the pre-crisis period.

In the longer term, the transformations caused by the pandemic will interact with existing structural changes to shape the demand for skills. Projections for the United States indicate that occupations in the energy sector – many of which are directly related to the introduction of “green” technologies, like wind turbine service technicians or solar photovoltaic installers – are expected to grow by more than 50% in the next decade. These trends are likely to be replicated in other developed OECD countries, particularly in the European Union, as the New Green Deal is implemented. An analysis of the skills requested in online vacancies indicates that workers in these occupations will need to develop a broad range of skills, from wind energy engineering, electronics and power generation to sales and marketing.

Population ageing is also poised to transform labour markets substantially. Employment in the healthcare sector is expected to increase dramatically in the next decade, with surging demand for occupations such as nurse practitioners, home health and personal care aides, physical therapist assistants, and medical and health services managers. Jobs in the tech and data analysis sector should also grow significantly, thanks to exponential growth in data availability for commercial, research and business use. Demand for statisticians, information security analysts, data scientists and mathematical science occupations, software developers and software quality-assurance analysts and testers, should also expand. The skills and technologies associated with these jobs (e.g. knowledge of software development and programming principles, or of specific programming languages such as Java), will be increasingly in demand, highlighting the need for training systems to adapt to these new requirements while keeping abreast of further changes in technology and corporate needs.

Report roadmap

The report details key results that can help OECD countries map the context of lifelong learning in the early 2020s. Most of the indicators and statistics refer to outcomes observed before the COVID-19 pandemic. The disruptions caused by the pandemic and the policy responses to limit its effects will have an impact on how skills are developed and used in the future. The lifelong learning framework illustrated in previous sections of this chapter emphasises the importance of adopting a long-term perspective on this matter. Future skill development and use depend heavily on past investments, choices and policy actions, with an important bearing on the design of effective responses to the pandemic.

The report reviews the experiences of countries that have successfully developed lifelong learning opportunities for all, and highlights policy lessons from the analyses. Such policy lessons provide broad guidance on the principles to be considered when designing and implementing skills policies centred on a lifelong perspective. They are not prescriptive, and should be tailored to the countries’ unique context at various points in time.

The report presents four analytical chapters featuring detailed results and examples of policy initiatives implemented in different countries or national subregions. For analytical purposes, chapters 2, 3 and 4 each consider a particular stage of people’s lives, delving into some of the processes guiding the development of skills, attitudes and knowledge at that particular stage. Many reports focus on lifelong learning from both a theoretical and an analytical perspective. This report centres on aspects that have traditionally been less considered, exploiting comparative quantitative data – namely, socio-emotional and motivational factors that influence engagement with lifelong learning. While such factors are uniquely

important to sustain lifelong learning in general, the pandemic has further increased their relevance. Finally, Chapter 5 mines information from online vacancies to evaluate the demand for different skills, knowledge and attitudes in various occupations, using a data-driven approach to characterise the degree of skill transversality and labour-market returns.

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2 Attitudes and dispositions: The foundations of lifelong learning

This chapter presents evidence on the effectiveness of different education systems in promoting lifelong learning attitudes (LLAs) in children. Teachers and parents play a key role in encouraging children to develop lifelong learning attitudes. Using data from the Programme for International Student Assessment (PISA) on 15-year-old students, the chapter shows that socio-economically disadvantaged students, boys and students with an immigrant background often lag behind their peers in developing lifelong learning attitudes. Such disparities, however, can be reduced. The chapter considers the role lifelong learning attitudes play in general, as well as their unique value in promoting learning during the disruptions to regular schooling produced by the COVID-19 pandemic.

Lifelong learning attitudes

The need for workers to reskill and upskill throughout life – particularly in a context of rapid digital transformations – has put lifelong learning at the forefront of the political agenda in most industrialised countries. Lifelong learning has become even more vital in the context of the COVID-19 pandemic, which induced large shocks to labour markets and societies worldwide, accelerating structural transformations that will force populations to acquire new skills. However, encouraging individuals to become lifelong learners is a complex task, and many obstacles hinder the effective engagement of adults in training programmes (see Chapter 4). Governments can tackle some obstacles – such as time or financial constraints – using short term measures. However only adopting a lifelong perspective can enable them to overcome other obstacles related to the disposition to learn and a lack of foundation skills originating from previous stages of an individual's education.

Becoming an effective lifelong learner involves a cumulative process, which starts in infancy and is influenced thereafter by the institutional arrangements that provide opportunities to learn (OECD, 2019^[1]). Learning at any stage of the life cycle builds on learning and skills acquired at previous stages (Cunha et al., 2006^[2]). Hence, setting strong foundations early in life is essential to cultivate lifetime learning. While developing strong cognitive skills – such as literacy or numeracy – is important, previous work by the OECD has shown that non-cognitive skills, as well as strong attitudes and dispositions to learn, constitute the necessary foundations for future learning (OECD, 2019^[1]). Some emotional skills and personality traits, such as conscientiousness and openness, can create a favourable disposition to learn later in life. Likewise, some attitudes, such as self-efficacy and intrinsic motivation, help individuals set goals for their learning endeavours.

While individual attitudes and dispositions to learn mostly develop early in life – starting with kindergarten and evolving throughout the schooling years – their benefits carry over into adulthood. In fact, individuals who have positive learning attitudes are more prone to engage in further learning throughout life (OECD, 2019^[3]; Tuckett and Field, 2016^[4]). Early education and compulsory schooling are therefore critical stages, where all students are given the chance to develop strong lifelong learning attitudes (LLLAs) and close monitoring of individual progress ensures that any arising gaps are rapidly identified and closed through timely interventions.

Building on this knowledge, this chapter examines the impact of students' lifelong learning attitudes on their achievement in school, as well as on their educational and career expectations. The chapter also sheds light on how teachers, school systems and families can inspire positive lifelong learning attitudes, and how governments can best support them in this endeavour.

The analysis mainly relies on data from the 2018 Programme for International Student Assessment (PISA) survey of 15-year-old students. This focus on teenage students stems from the evidence that learning attitudes reported by adolescents tend to be substantial predictors of future outcomes, including university attendance and employment in high-skilled occupations (OECD, 2018^[5]). Students who have developed high levels of intrinsic motivation and self-efficacy by the time they are 15 are more likely to seek learning opportunities at future stages of the life cycle than students who have not. Non-cognitive skills and learning attitudes develop until the age of 20 (unlike cognitive skills, which are fairly well settled in the first ten years of life), and are therefore still malleable at age 15. Hence, analysing lifelong learning attitudes among adolescents, and identifying those who are lagging in their development, helps target at-risk individuals at a time when interventions can still effectively improve their lifetime learning opportunities (Cunha and Heckman, 2008^[6]). For example, research has shown that policies aimed at improving lifelong learning attitudes among disadvantaged adolescents may substantially narrow the gap in educational achievement observed at age 16, reducing disparities in future outcomes (Chowdry, Crawford and Goodman, 2011^[7]). While secondary school represents a critical time for developing positive learning attitudes, it should be noted that attitudes formed by young adulthood are not only developed during adolescence, but also at

earlier stages. Some sections of this chapter will therefore highlight practices and interventions that should be applied to early childhood contexts to help children develop strong lifelong learning attitudes.

The chapter focuses on six lifelong learning attitudes, measured with indicators constructed from data collected through the PISA student questionnaire. The *PISA 2018 Technical Report* provides details on indicator construction (OECD, 2020^[8]).

These attitudes reflect the main traits observed among individuals who show a high propensity to engage in lifelong learning. Examining the various characteristics of lifelong learners is important to develop educational practices that bolster students' development of crucial lifelong learning attitudes. Among the attributes of lifelong learners, Canday (1991^[9]) identified motivation to gain new knowledge and curiosity, a sense of personal efficacy and information literacy (i.e. the ability to research and evaluate information). Knapper and Cropley (2000^[10]) found self-directed learning and willingness to learn – both in formal and non-formal settings, and from peers, teachers or mentors. The lifelong learning attitudes identified and analysed reflect different temporal and contextual processes. Some are specific to the school context and hence more likely to create short-term benefits. Others occur in more general contexts and, if maintained throughout adulthood, can produce long-term benefits. The lifelong learning attitudes are presented below in ascending order, from the more specific to the more general:

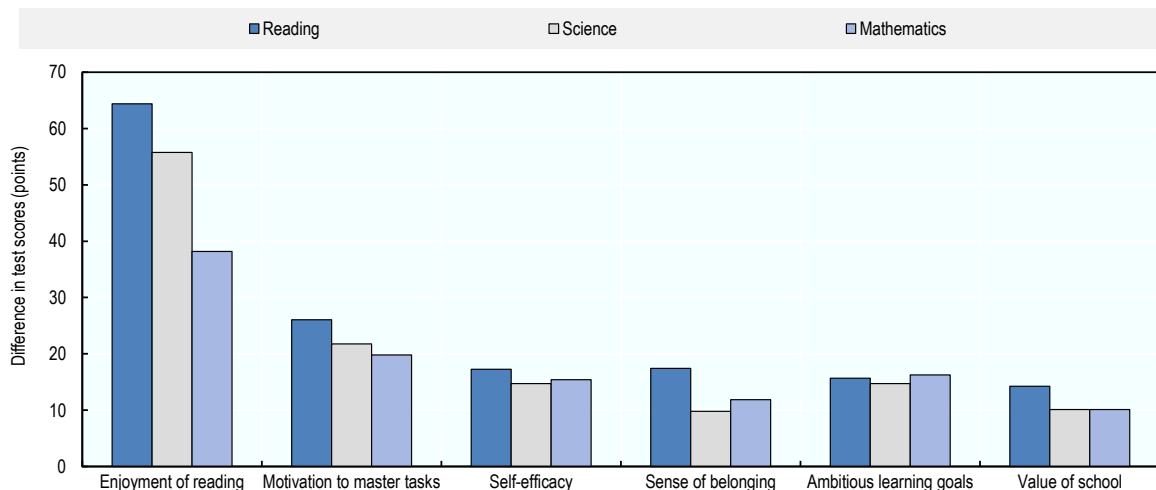
- sense of belonging to the school community (*sense of belonging*)
- relevance students attribute to school for their future professional careers (*value of school*)
- students' commitment to work hard and improve performance (*motivation to master tasks*)
- students' ambition to learn and understand as much as possible (*ambitious learning goals*)
- students' ability to overcome difficulties on their own (*self-efficacy*)
- satisfaction students obtain from learning and reading (*enjoyment of reading*).

Student attitudes towards learning and contemporaneous achievements

Figure 2.1 illustrates the relationship between students' lifelong learning attitudes and contemporaneous achievements in reading, science and mathematics. The results indicate that students who have higher levels of lifelong learning attitudes (as represented by values in the top quartile of the national distribution of each attitude) display greater proficiency compared to pupils with weaker attitudes (as represented by values in the bottom quartile). For example, when comparing students with similar characteristics in terms of socio-economic status (SES), gender, age and immigration status, as well as a school's socio-economic background and type (private/public, rural/city), and the type of programme attended (general/vocational), the scores obtained in the reading test by students with the highest levels of enjoyment of reading are 66 points higher than those of students with the lowest levels of enjoyment of reading. Similarly, other things being equal, the maths results obtained by students who report a high level of motivation to master tasks are 20 score points greater than those of students reporting low levels of motivation to master tasks. While these estimates cannot be interpreted causally, they highlight strong associations that correspond with accumulated evidence on the relationship between non-cognitive skills, learning attitudes and school performance (Behncke, 2009^[11]; Heckman, Stixrud and Urzua, 2006^[12]).

These results are consistent with findings from analyses based on PISA 2000 and 2009 when reading was examined at length. Previous work found that students who enjoy reading tend to make it a regular part of their lives and enhance their reading skills through practice – in fact, enjoyment of reading explained around 20% of the variation in student reading skills across OECD countries (OECD, 2011^[13]). These estimates corroborate research showing that enjoyment of reading is an important precondition for becoming an effective learner. Importantly, research also documents a strong link between reading practices, motivation and proficiency among adults (OECD, 2011^[14]), highlighting the importance of kindling students' interest in reading to improve both short- and long-term outcomes.

Figure 2.1. Score-point difference in reading, science and mathematics performance between students in the top vs. bottom quartile of indicators of lifelong learning attitudes



Note: Bars represent score-point differences in PISA tests in reading, science and mathematics between students with LLLAs in the top vs. bottom quartiles. Regressions take into account a student's SES, gender, age, immigration status, type of school attended (socio-economic background, private vs. public, rural vs. city) and type of programme attended (general vs. vocational). Separate regressions are estimated for each attitude.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Research has highlighted the importance of deriving pleasure from reading at an early age. A longitudinal study conducted in England (United Kingdom) showed that reading pleasure at age 16 is associated with contemporaneous intellectual progress in vocabulary, spelling and mathematics (even when controlling for previous cognitive skills, as measured by test scores at 6 years and 10 years of age) (Sullivan and Brown, 2013^[16]). Interest in reading is a much more important prerequisite for acquiring skills than having a parent who holds a higher education degree (as compared to no qualification). Sullivan and Brown (2013^[16]) suggest that independent reading can promote a self-sufficient approach to learning overall, with positive implications for achievement in other subjects.

Reading pleasure also yields positive associations with more general indicators of personal and educational development. Individuals who enjoy reading tend to exhibit greater reading comprehension and writing abilities, as well as higher levels of general knowledge (Cullinan, 2000^[17]), which are important foundations for future learning. They also develop positive reading attitudes (Guthrie and Alvermann, 1999^[18]). Research has shown that children who enjoy reading at a young age continue to read for pleasure at future stages of the life cycle, with positive implications for lifetime reading habits (Sanacore, 2002^[19]).

Although enjoyment of reading seems to be the strongest predictor of academic achievement among the attitudes considered, students' motivation to master tasks and self-efficacy are also strongly associated with academic performance. A large body of research has focused on self-efficacy – generally defined as beliefs and judgements about one's ability to accomplish specific tasks – as a crucial attribute of proficient and lifelong learners. Self-efficacy generally influences students' choices, as well as the effort and perseverance they put into learning tasks (Pajares, 1997^[20]), resulting in greater learning and academic performance (Mone, 1994^[21]). Previous literature has also demonstrated the linkages between motivation and academic success (Robbins et al., 2004^[22]; Hattie, 2008^[23]; Wigfield, Tonks and Lutz Klauda, 2016^[24]).

The results of these studies suggest that certain lifelong learning attitudes (particularly those that are less specific to the school environment, and hence more likely to be carried over into adulthood) are strongly connected to contemporaneous achievement in school, and may help develop crucial skills that will underpin future learning. Based on the literature, pupils who possess stronger cognitive skills in adolescence and young adulthood are more likely to seek additional learning opportunities later in life, and to reap larger returns from investments in additional education.

The role of positive learning attitudes during the COVID-19 pandemic

Developing strong attitudes towards learning is even more important and urgent in the context of the COVID-19 pandemic, which has caused major disruptions to school activities across the OECD region. Many countries around the world halted face-to-face teaching in response to the pandemic: in April 2020, 1.6 billion learners were affected by physical closures of schools and other educational institutions¹ (UNESCO, 2020^[25]). Education policy makers had to find alternatives to guarantee children's right to education, with many systems switching to distance learning combining online teaching with other remote learning materials, such as television or radio.

Although remote schooling and distance learning are desirable options compared to no schooling at all – which causes major interruptions to student learning, with long-lasting consequences for the affected cohorts (Burgess, 2020^[26]; Hanushek and Woessmann, 2020^[27]) – they will probably slow progress in achievement and widen existing social disparities in learning compared to a business-as-usual scenario. According to emerging evidence, the rapid and unexpected transition from regular schooling to forced remote learning during the pandemic has sometimes led to large learning losses, notably among pupils from disadvantaged backgrounds and younger cohorts (Box 2.1).

While the available evidence points to slower progress due to distance learning – particularly among younger cohorts – the pandemic will probably have very heterogeneous effects across countries. Among the many factors affecting student progress are the duration of distance learning, the interventions put in place by education systems to support learning, and different systems' level of preparedness for such a situation. Indeed, most pupils, parents and teachers were unprepared and faced major challenges while trying to adapt to the new circumstances so abruptly. This may explain the variation in learning gains observed across and within countries.

Besides major infrastructural issues (such as insufficient broadband connectivity or information and communication technology [ICT] equipment at home) that prevented some students from attending online classes regularly during the first wave of the pandemic, other factors may have impeded the learning process and the pace of skill accumulation. Some teachers and pupils may have been completely unprepared for online instruction, whereas others may have been using digital tools for school-related activities for some time. Figure 2.2 shows great variations in 15-year-olds' use of technology for schoolwork in 2018 – both across countries and across socio-economic groups within countries – heightening the concern that students who were less experienced in ICT may have suffered the most from the shock caused by remote learning during the pandemic. Disparities among socio-economic groups were particularly large in Australia, Mexico, Korea and the United States. Similar differences were observed between public and private schools, with students in private schools using digital technologies more frequently for schoolwork.

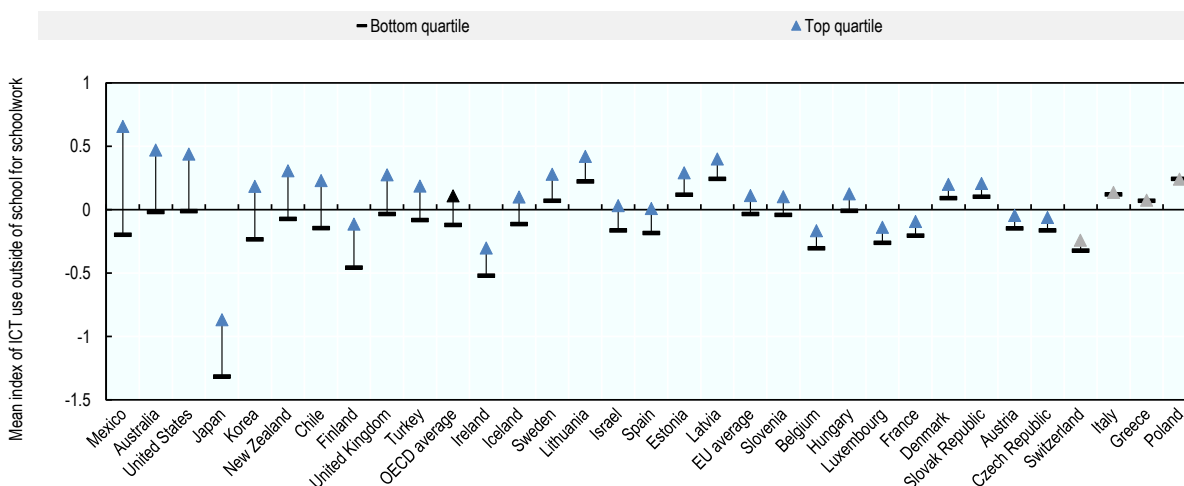
Box 2.1. Did school closures during the COVID-19 pandemic slow learning?

A study conducted in **Switzerland** in 2020 compared learning gains during the eight weeks of school closures related to the COVID-19 pandemic with learning gains in the eight weeks preceding the closures. Tomasik, Helbling and Moser (2020^[28]) analysed the performance in mathematics and German (the instructional language) of 28 685 pupils from grades 3 to 9 (14 134 children in primary school and 15 551 in secondary school). The study indicated that learning significantly slowed for primary school pupils (who learned more than twice as fast in the classroom than through distance education); additionally, heterogeneity in their learning progress increased considerably, possibly reflecting differences associated with socio-economic backgrounds. By contrast, the learning pace of secondary school pupils was not significantly affected. The authors suggest that the increased variance and decreased pace of learning in primary schools can be explained by cognitive, motivational and socio-economic factors. Younger pupils rely more on cognitive scaffolding during instruction, as their capabilities for self-regulated learning and autonomy might not be fully developed (Tomasik, Helbling and Moser, 2020^[28]).

A study from the **Netherlands** analysed the effects of school closures on primary school performance over a period of eight weeks, using rich data on 350 000 pupils from grades 4 to 7. As national assessments in the Netherlands take place in January-February and May-June, (Engzell, Frey and Verhagen, 2020^[29]) were able to compare students' performance in mathematics, spelling and reading comprehension immediately before and after the nationwide school closures; they also compared this performance with learning gains measured in the three previous years. Using a difference-in-difference design, they showed that students learned less during the lockdown than in a typical year, with evidence of losses in all grades and subjects. The learning losses amount to 3 percentile points in the national distribution relative to a typical year, equivalent to 0.08 of a standard deviation on average (i.e. one-fifth of a school year), suggesting that students made little or no progress while learning from home. The results also showed that students from disadvantaged backgrounds were particularly affected, with a 55% larger learning slide than in the general population (Engzell, Frey and Verhagen, 2020^[29]).

A study from **Belgium** uses panel data on a large sample of primary school pupils in grade 6 from 2015 to 2020. The analysis is based on standardised tests in mathematics, language (Dutch), social sciences, science and French, which are administered annually in the last year of primary school by the network of catholic schools in Flanders (Belgium). Exploiting the panel data structure and performing a difference-in-difference estimation, (Maldonado and De Witte, 2020^[30]) show that school closures resulted in significant learning losses and a substantial increase in educational inequality. More specifically, school averages for standardised test scores decreased by a 0.19 standard deviation for mathematics and a 0.29 standard deviation for Dutch compared to previous cohorts. The study also showed that educational inequalities increased both within and across schools. The increase in learning losses across most indicators of SES explained some of the variation within and across schools (Maldonado and De Witte, 2020^[30]).

Figure 2.2. Mean index of ICT use outside of school for schoolwork, by socio-economic group



Note: The index of ICT use outside of school for schoolwork measures how frequently students do homework on computers, browse the Internet for schoolwork, use email for communications related to school, visit the school website and/or upload or download materials on it. Higher values of this index correspond to more frequent and more varied uses. Socio-economically disadvantaged/advantaged students are defined as students in the bottom/top quartile of the PISA index of socio-economic status. Countries are ranked in descending order based on the magnitude of the difference in the index between the top and the bottom quartile of economic, social and cultural status. Symbols in grey indicate that the difference between the top and the bottom quartile is not statistically significant (5% level).

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Similarly, teachers differed greatly not only in their experience with digital tools, but also in their motivation to develop pedagogically effective instruction in the digital space. This may have resulted in large variations in the quality of remote instruction across schools (Tomasik, Helbling and Moser, 2020^[28]).

The home learning context also exposed learners to unique challenges. The absence of a teacher supervising students' learning behaviours (as in traditional classroom teaching), together with the lack of peer effects, may have prompted some younger or more vulnerable students with limited capabilities for self-directed learning to pay less attention during instruction and devote less effort to assignments. The specificities of home schooling forced pupils to rely considerably more than usual on their intrinsic motivation to learn and self-regulating learning skills, as well as on parental regulation and support. These attributes and dispositions to learn are crucial if pupils are to remain focused and motivated in difficult learning environments and students who lacked such attitudes might particularly suffer from learning losses associated with online instruction.

Teachers interviewed in a Finnish study reported that one of their main challenges was to engage students with weaker attitudes towards schoolwork. These pupils perceived digital assignments as less important than tangible assignments, and were therefore unmotivated and unwilling to put effort into them (Iivari, Sharma and Venta-Oikkonen, 2020^[31]).

The probability that students with stronger attitudes will thrive in the difficult circumstances induced by large-scale online instruction underscores the importance of ensuring that education systems support all students – especially at-risk and vulnerable students – in developing such crucial attitudes. Lifelong learning attitudes enabled some students to adapt to new circumstances during the pandemic, rather than suffer the negative consequences of profound structural changes. Lifelong learning attitudes are also likely to prove essential for individuals to thrive and prepare for new potential transformations in a post-pandemic world. The next sections explore the most effective practices through which teachers, schools and families can stimulate the formation of such important attributes.

Lifelong learning attitudes and children's educational and career expectations

Positive attitudes towards learning can be crucial for students to keep learning at a similar pace during the COVID-19 pandemic as during regular classroom instruction. Even in normal times, strong attitudes and dispositions to learn can augment students' efforts and performance in school. Importantly, the benefits of strong learning attitudes often carry over into adulthood, encouraging individuals to seek further learning opportunities throughout life.

In addition, when students have strong intrinsic motivation and set ambitious learning goals for themselves, they are more likely to develop high educational and career expectations compared to students with less positive attitudes. During adolescence, when students start to think seriously about their future, expectations often determine future outcomes (Guyon and Huillery, 2020^[32]). They can even be self-fulfilling, as students may only invest enough effort to meet their own expectations (OECD, 2017^[33]; OECD, 2012^[34]). When comparing students with similar performance in school and similar socio-economic origins, those who expect to complete tertiary education are more likely to meet their objectives than those with lower expectations (Beal and Crockett, 2010^[35]). In the same vein, students who expect to drop out of school are more likely to do so (Morgan, 2005^[36]).

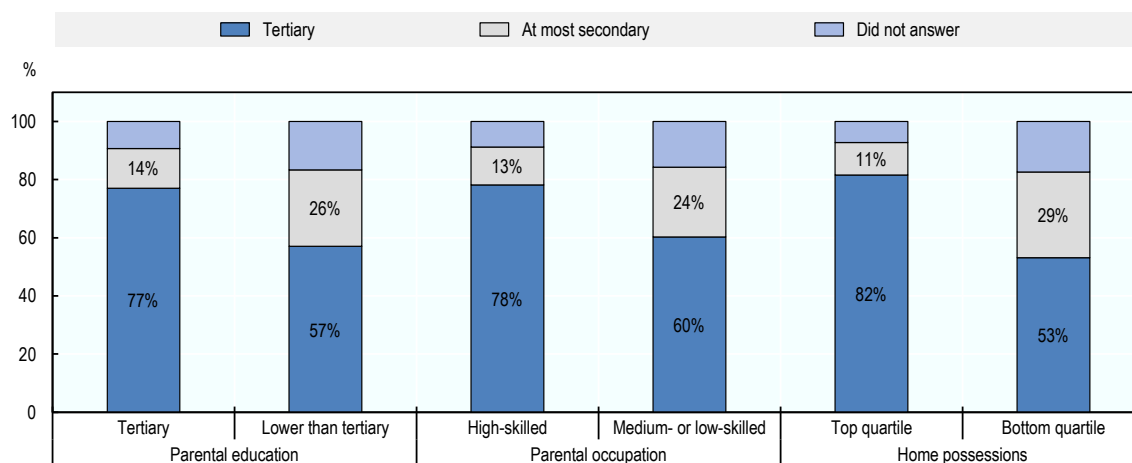
The psychological literature has highlighted different factors shaping students' expectations, including their personal experiences in school, their past and present academic achievements, and the influence exerted by the learning environment and the people surrounding them as they grew up (e.g. families, peers and teachers) (Buchmann and Dalton, 2002^[37]). The influence of these factors on students' expectations varies substantially. This section illustrates significant differences in young students' educational and career expectations, both across countries (with regard to the institutional context) and within countries. It shows how the development of specific lifelong learning attitudes is associated with higher educational and career expectations.

Educational and career expectations among 15-year-old students: Gaps by socio-economic background

Students' expectations for their educational and occupational prospects tend to differ across socio-economic backgrounds. More-advantaged students are more likely to expect to continue their studies for a longer period of time and to work in a managerial or professional occupation by the age of 30 than their socio-economically disadvantaged peers (Box 2.2). Figure 2.3 shows the percentage of 15-year-old students who expect to complete tertiary education, do not expect to obtain tertiary qualifications and did not respond, by SES. More specifically, their SES is measured through three distinct indicators, based on the information collected in the PISA survey: i) parental educational attainment; ii) parental occupational status; and iii) availability of resources in the household, including educational and cultural resources.

According to all three measures, high-SES students are more likely to expect to complete university than their less-advantaged peers. For example, nearly 77% of students with at least one parent who completed tertiary education expect to complete university, compared to only 57% of their peers whose parents have lower education levels. Such gaps in expectations between socio-economic groups could reflect, for instance, a lack of financial resources to engage in further education or a paucity of role models in the family, undermining children's aspirations (OECD, 2017^[33]).

Figure 2.3. Percentage of 15-year-old students who expect to complete tertiary education or secondary education, by SES group



Note: Bars represent the percentage of advantaged or disadvantaged students who expect to complete university or at most secondary education. SES groups are defined according to three indicators: parental education, parental occupation and home possessions. Home possessions refers to an index constructed in PISA (HOMEPOS); quartiles are computed relative to the national distribution. Shares in light blue represent missing information.

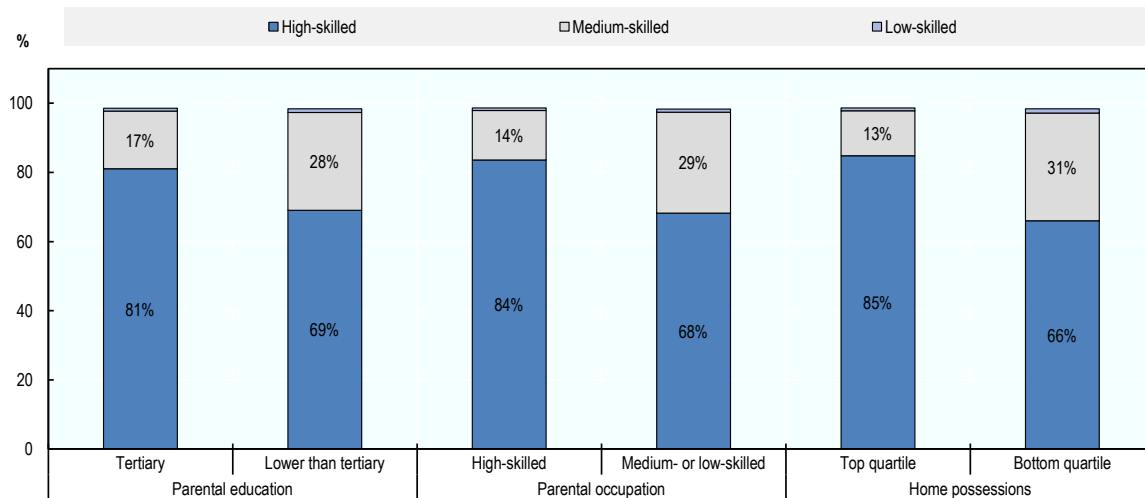
Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The PISA 2018 survey asked students which occupation they expected to be working in at the age of 30. Answers to this open-ended question were coded into four-digit International Standard Classification of Occupations (ISCO) codes and classified into high-skilled, medium-skilled and low-skilled occupations, based on the one-digit ISCO-08 classification. For example, managerial or professional professions were classified as high-skilled, whereas clerical support workers or service and sales workers were classified as middle-skilled occupations.

Figure 2.4 shows the percentage of 15-year-olds who expect to be working in high-skilled, medium-skilled or low-skilled occupations at age 30, according to their SES. Large proportions (up to 84%) of students whose parents work in high-status occupations also expect to be employed in high-skilled occupations, whereas fewer students from disadvantaged backgrounds have such ambitions. These gaps in career expectations probably reflect the existence of different role models in their households. Interestingly, Figure 2.4 suggests that irrespective of SES at age 15, virtually no student expects to work in a low-skilled occupation by age 30. This is consistent with the literature, which has found that adolescents' career expectations are often misaligned with the opportunities available in the job market. According to a study by Mann et al. (2013^[38]), the career aspirations of British teenagers aged 13-18 had little in common with the expected patterns of labour-market demand.

Figure 2.4. Percentage of 15-year-old students who expect to be employed in a high-, medium- or low-skilled occupation, by quartile of SES indicators



Note: Bars represent the percentage of students who expect to be employed in a high-, medium- or low-skilled occupation according to their SES, measured by three indicators: parental education, parental occupation status and household possessions. Home possessions refers to an index constructed in PISA (HOMEPOS); quartiles are computed relative to the national distribution.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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This evidence of social gaps in young people's expectations corroborates past findings that adolescents' expectations for their further education and career are strongly influenced by their family's history and aspirations for them, or the type of school and programme they attend (Dupriez et al., 2012^[39]; Howard et al., 2015^[40]). Previous studies also point to a significant misalignment between education and career expectations among students in PISA 2018, particularly among socio-economically disadvantaged students compared to advantaged students (OECD, 2019^[41]). Such misalignments can be detrimental to students' prospects. Longitudinal studies conducted in the United Kingdom have shown that adolescents who underestimate the education level required to enter their desired profession are more likely to end up not in education, employment, or training before the age of 20 (Musset and Kurekova, 2018^[42]).

Previous studies have also shown that social differences in educational and career expectations and aspirations persist even when comparing students from similar socio-economic backgrounds who achieve the same proficiency levels in school. Such differences across SES groups represent a concern for policy makers, since young students' aspirations determine their choices and educational investments – and hence, their future outcomes (Box 2.2). Conversely, immigrant students tend to exhibit higher educational and career expectations than their peers with similar academic performance and SES, possibly as a result of stronger attitudes and greater optimism (Box 2.3).

Box 2.2. The role of socio-economic background in shaping young students' expectations

Previous OECD analyses (Mann et al., 2020^[43]) have suggested that the family's socio-economic background is a key determinant of adolescents' educational and career expectations. Indeed, when focusing only on high-achieving students – defined as those who have attained at least minimum proficiency (Level 2) in the three PISA core subjects and are high performers (Level 4) in at least one of the subjects – students who intend to pursue tertiary education are highly concentrated among advantaged students. Among high-performing students, those who come from an advantaged background are more than twice as likely to have high expectations than students from disadvantaged backgrounds across OECD countries. Similarly, high-performing students from advantaged backgrounds are significantly more likely than their disadvantaged peers with equal academic ability to expect to be working in a professional or managerial activity by the age of 30.

A recent study by Guyon and Huillery (2020^[32]) provides empirical evidence from 14-year-old French students that adolescents' aspirations are socially biased because of psychological factors stemming from social stereotypes, and that such biases reinforce social inequalities in educational attainment. The authors focus on a sample of French students in grade 9, at which point they must choose whether to pursue their schooling in an academic or vocational track. Guyon and Huillery (2020^[32]) devised a survey to measure students' educational and professional aspirations at the beginning of the 9th grade, and determine the underlying mechanisms for setting these aspirations. The authors asked students to list all the academic tracks they know of, which tracks they feel capable of pursuing and which tracks they would prefer to pursue. They also measure students' scholastic self-esteem and beliefs about the influence of social origin on future academic success. Such investigations allow them to analyse the role of social stereotypes in educational aspirations.

The authors' findings show that regardless of their scholastic performance, low-SES students underestimate their current academic ability compared to their high-SES classmates, and all students overestimate the influence of social origin on future academic success. Students with lower SES are also less aware of the academic tracks available to them. These two mechanisms show that social inequalities in educational aspirations are not driven by differences in professional aspirations, nor can they be explained by students' different expectations of labour-market returns or preferences for professions linked to their social identity. Guyon and Huillery (2020^[32]) conclude that educational aspirations are socially biased. This is important because they affect later school outcomes, including annual average grades and test scores upon completion of grade 9, as well as the probability of entering an academic high school in grade 10. Overall, such biases prevent low-SES students from reaching their best educational outcomes in ways that are not compatible with maximised utility (Guyon and Huillery, 2020^[32]).

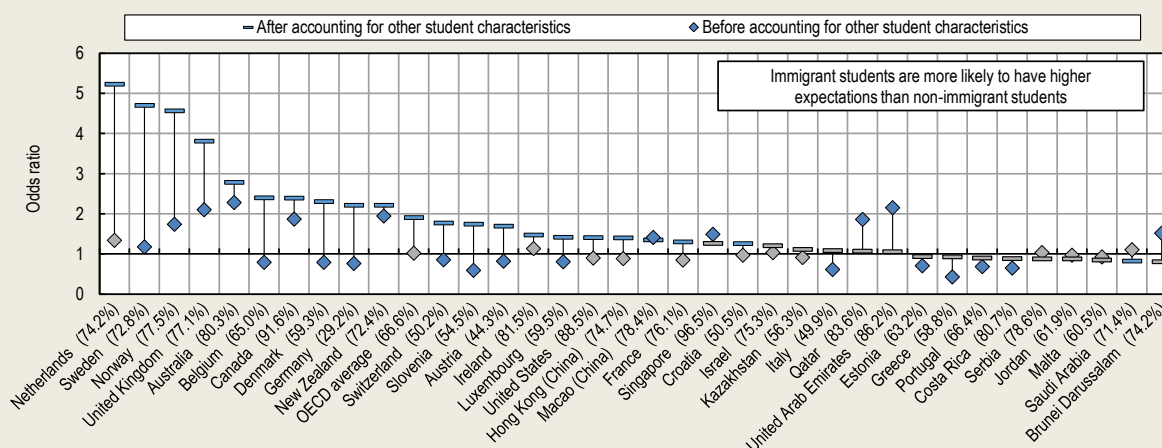
Box 2.3. Immigrant students' expectations

Several studies conducted from both a national and an international perspective have documented that immigrant students perform less well in school than their native-born peers (Marks, 2005^[44]). Confirming these findings, analyses of 2018 PISA data revealed a large gap in reading performance between immigrant and native students across OECD (OECD, 2019^[41]). This gap is likely related to different factors. For example, immigrant students tend to lack the same resources as their native peers, as their parents are generally less educated, work in lower-status jobs, earn lower incomes and are less proficient in the language of the destination country.

Despite these gaps in performance, previous studies have shown that young immigrants – especially those from disadvantaged families – often hold higher educational or career aspirations than their native peers. Heath and Brinbaum (2007^[45]) suggested that this gap may reflect immigrant students' optimism and expectations of upward social mobility. For example, a German study showed that Turkish students were more ambitious than their native classmates, probably owing to different mechanisms driving students' expectations. While German students were mainly motivated by a desire for social status, Turkish students' high educational ambitions were motivated by their desire for upward social mobility (Salikutluk, 2016^[46]). OECD analyses of PISA 2018 confirmed these results (Figure 2.5).

Figure 2.5. Students' expectations of completing tertiary education, by immigrant status

Likelihood that immigrant students expect to complete a tertiary degree compared to non-immigrant students, before and after accounting for students' SES and performance in reading



Note: The percentage of immigrant students who expect to complete a tertiary degree is shown in parentheses next to the country/economy name. Countries where less than 5% of students have an immigrant background are not represented in the figure. Statistically insignificant coefficients are marked in grey.

Source: OECD (2019^[41]), *PISA 2018 Results (Volume II): Where All Students Can Succeed*, <https://doi.org/10.1787/b5fd1b8f-en>; OECD, (2019^[41]), *PISA 2018 Results (Volume II): Where All Students Can Succeed*, Table, II.B1.9.5, <https://doi.org/10.1787/b5fd1b8f-en>; OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.


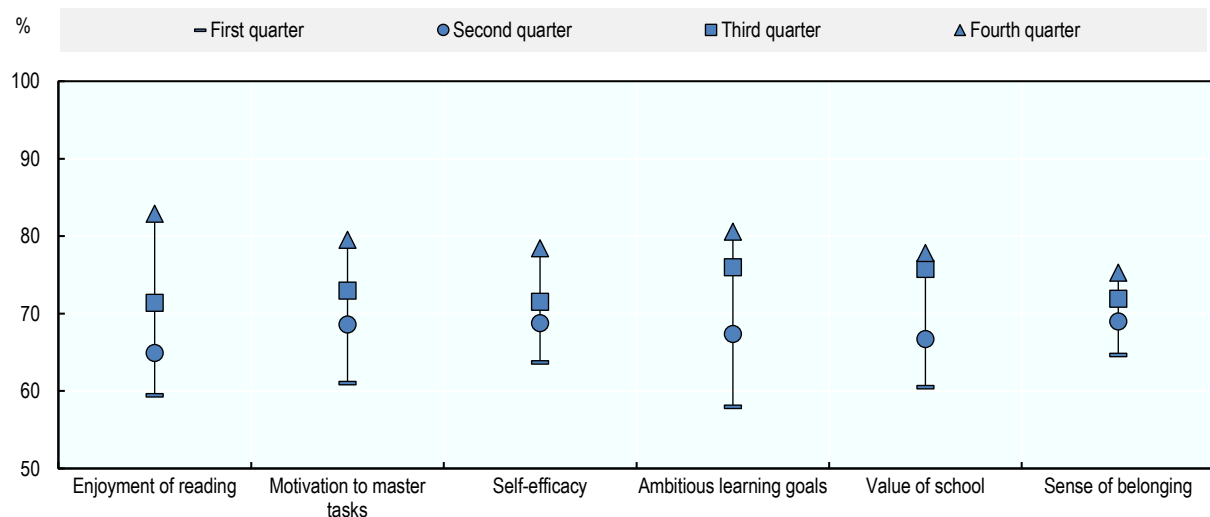
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Figure 2.5 shows that in many OECD countries – e.g. Australia, Belgium, Canada, Denmark, Finland, Germany and the Netherlands – students with an immigrant background are more than twice as likely to expect to complete tertiary education than their native counterparts, after factoring in students’ SES and performance in reading, and schools’ socio-economic profile. This suggests that once academic performance is factored in, immigrant students’ higher aspirations may reflect stronger attitudes and personal attributes. For example, further analyses of PISA data indicated that academically resilient immigrant students (i.e. those who managed to reach the top quartile in the national distribution of reading performance) have greater enjoyment of reading, motivation to master tasks and goal orientation. Importantly, they are significantly (27%) more likely to expect to complete tertiary education than their less-resilient peers. This may be because immigrant students who are capable of overcoming adversity are more likely to exhibit positive attitudes towards their own education, possibly resulting in higher educational aspirations (OECD, 2019^[41]).

Students’ lifelong learning attitudes and their educational and career expectations

Figure 2.5 shows the percentage of 15-year-old students who expect to complete tertiary education by quartile of each index of lifelong learning attitudes. Students in the fourth quartile have the highest levels of attitudes, and those in the first quartile have the lowest. The figure indicates that expectations of obtaining a tertiary degree are consistently higher among adolescents who report higher levels of lifelong learning attitudes. For example, 85% of 15-year-old students with high enjoyment of reading expect to complete a tertiary degree, compared to only 60% of students with low enjoyment of reading. Similarly, 80% of 15-year-old students with ambitious learning goals expect to complete a tertiary degree, compared to only 60% of students with less ambitious learning goals.

Figure 2.6. Percentage of students expecting to complete tertiary education by quartile of lifelong learning attitudes, OECD average



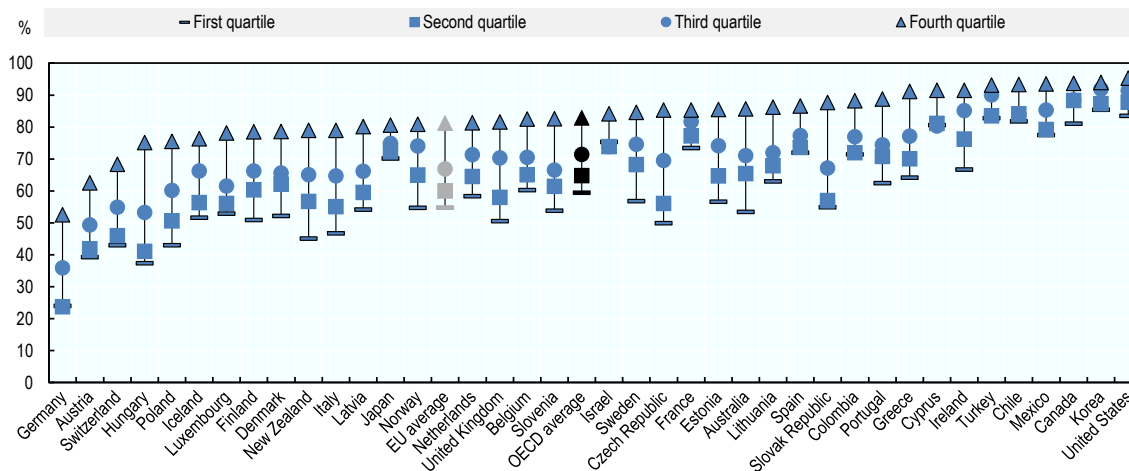
Note: The figure displays the percentage of students who expect to complete tertiary education by quartile of each attitude. Quartiles of attitudes are constructed relative to the within-country distribution of the attitude indexes. Students in the fourth quartile have the highest values of attitude, and students in the first quartile have the lowest values of attitudes.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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While this pattern applies to all OECD countries, some heterogeneity is observed in the strength of this association. Figure 2.7 shows the relationship between students' expectations to complete tertiary education and quartiles of the index of enjoyment of reading² by country.

Figure 2.7. Percentage of students expecting to complete tertiary education, by quartile of joy of reading index and by country



Note: The figure displays the percentage of students who report that they expect to complete tertiary education, by quartile of the index of joy of reading and by country. Values corresponding to the OECD average and the EU average are reported in different colours.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/kvfha3>

In some countries – such as Canada, Chile, Korea, Turkey and the United States – the percentage of students who expect to complete tertiary education ranges from 80% in the bottom quartile of enjoyment of reading to over 90% in the top quartile. Students in Austria, Germany, Hungary, Poland and Switzerland, on the other hand, appear to have lower expectations. In Germany, for example, only 24% of students in the bottom quartile of enjoyment of reading and 53% of students in the top quartile expect to complete university. These estimates suggest that students' expectations of further education may be influenced by the structure of education systems (OECD, 2017^[33]). In highly differentiated education systems that stream students early into vocational education – as happens in Germany, Switzerland and Czech Republic – adolescents' expectations tend to be more aligned with their educational paths. Thus, students may have developed low expectations by age 15 because such systems have already determined whether or not they are likely to qualify for admission to university. In comprehensive education systems, pupils can more easily change their minds and update their expectations, which might induce them to develop less realistic expectations (Sikora and Saha, 2007^[47]; Buchmann and Park, 2005^[48]).

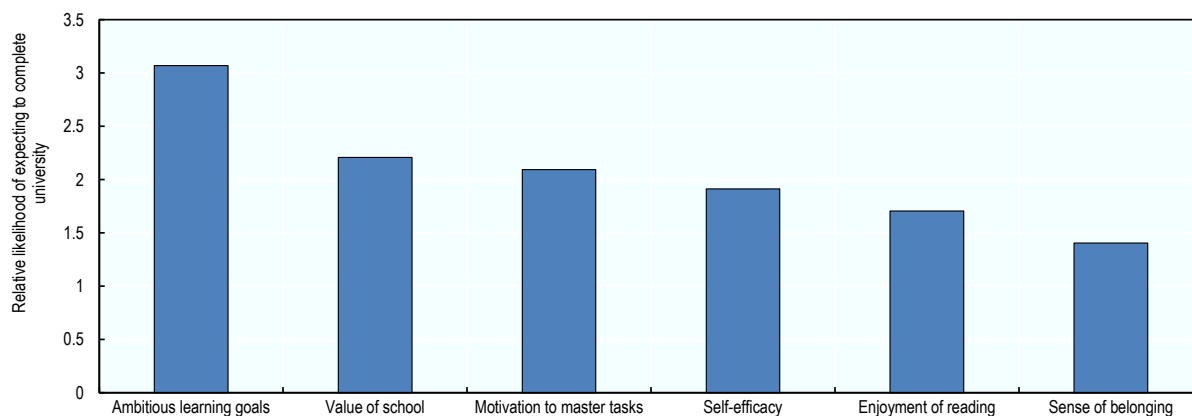
Students' educational expectations are also high in Chile and Mexico, where national education systems are not as standardised and differentiated. This may corroborate previous evidence indicating that all other things being equal, pupils tend to have higher educational and occupational expectations in countries with lower socio-economic development and higher economic inequalities. Perceptions of economic inequality may create a climate in which the urge to move to the top, and the fear of not making it, boost expectations (Sikora and Saha, 2007^[47]).

Figure 2.7 also suggests that in some countries (such as Australia, Czech Republic, Hungary, Italy, New Zealand and the Slovak Republic), differences in educational expectations across groups of students with different levels of enjoyment of reading are very pronounced, sometimes amounting to 40 percentage points between the top and bottom quartiles. In other countries (e.g. Israel, Japan, Korea, Turkey and the United States), such differences amount to fewer than 10 percentage points. This again suggests that in countries that adopt early tracking of student performance (e.g. Czech Republic, Germany and Hungary), students with weaker levels of enjoyment of reading (and weaker lifelong learning attitudes more generally, as the results hold across all attitudes) experience larger gaps and significantly lower expectations – possibly because their expectations are more aligned with their achievements and attitudes (OECD, 2019^[41]).

Students with strong lifelong learning attitudes differ on a number of dimensions that are also associated with educational ambitions. Figure 2.8 illustrates the differences in students' expectations to complete a tertiary degree after considering differences in their SES, gender and performance in reading tests, as well as their school's socio-economic background. All other factors being equal, students with stronger lifelong learning attitudes tend to develop higher educational aspirations. This association is particularly strong when considering ambitious learning goals, motivation to master tasks and the value of school. For example, when comparing students with strong similarities in terms of their SES, academic performance and type of school attended, those who have developed stronger learning goals are more than three times as likely to expect to pursue tertiary education than their peers with weaker learning goals. Similarly, otherwise comparable pupils who have strong motivation to learn or attach great value to school are more than twice as likely to develop ambitious educational aspirations than pupils with weaker attitudes.

Figure 2.8. Adolescents' expectations to complete tertiary education and lifelong learning attitudes

Odds ratios of expecting to complete tertiary education for students in the top quartile relative to the bottom quartile of LLLAs, OECD average



Note: Bars represent the likelihood that students in the top quartile of each index of LLLAs expect to complete tertiary education relative to students in the bottom quartile. These are the odds ratios from logistic regressions. Separate regressions have been estimated for each attitude. Estimates factor in a student's SES, gender and cognitive skills, as well as the school's socio-economic background.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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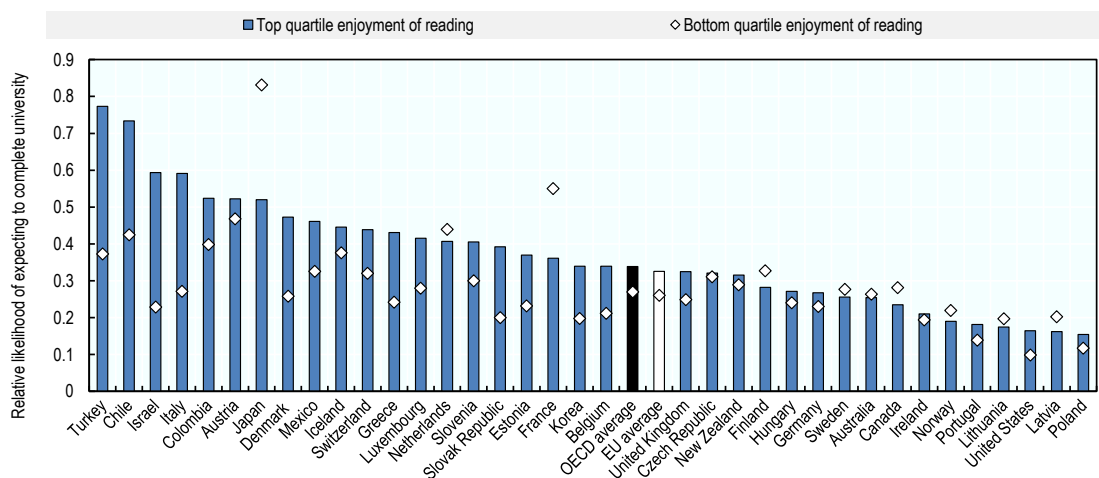
The strong positive relationship between certain lifelong learning attitudes and a student's expectation to complete tertiary education could mean that developing strong attitudes towards learning may help reduce gaps in educational expectations between pupils from different socio-economic backgrounds. Further analyses of PISA data have investigated whether lifelong learning attitudes play a role in closing such gaps

between adolescents with high and low SES. They show that among the lifelong learning attitudes considered, students' enjoyment of reading – and, to a lesser extent, ambitious learning goals – are associated with significant reductions in the gaps observed across socio-economic groups.

Figure 2.9 shows the relative likelihood (odds ratios) of expecting to complete tertiary education vs. lower education levels for students with low SES relative to students with high SES, as represented by students in the bottom and top quartiles of the PISA index of economic, social and cultural status (ESCS). A value of 1 means that students with high and low SES report an equal probability of expecting to complete tertiary education. A value above 1 means that low-SES students have a higher probability of expecting to complete tertiary education; a value below 1 means that they have a lower probability of expecting to complete tertiary education. Estimates of these gaps cover students in the top and bottom quartiles of the index of enjoyment of reading.

Figure 2.9. Gaps by SES in expectations to complete tertiary education and students' enjoyment of reading

Odds ratios of expecting to complete tertiary education for low-SES students relative to high-SES students, computed in the bottom and top quartiles of the index of enjoyment of reading



Note: Estimates represent the odds ratios of expecting to complete university education (rather than lower education levels) for students with low SES relative to students with high SES. Higher values mean that the probability of expecting to complete university education for low-SES students is closer to that of high-SES students. A value of 1 means that low- and high-SES students have an equal probability of expecting to complete university education. Odds ratios are computed on the subsample of students in the top (bars) and in the bottom (markers) quartiles of the index of enjoyment of reading. Regressions take into account a student's gender, age and reading test scores, and schools' socio-economic backgrounds.

Source: OECD calculations based on OECD (2018_[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/ob1q37>

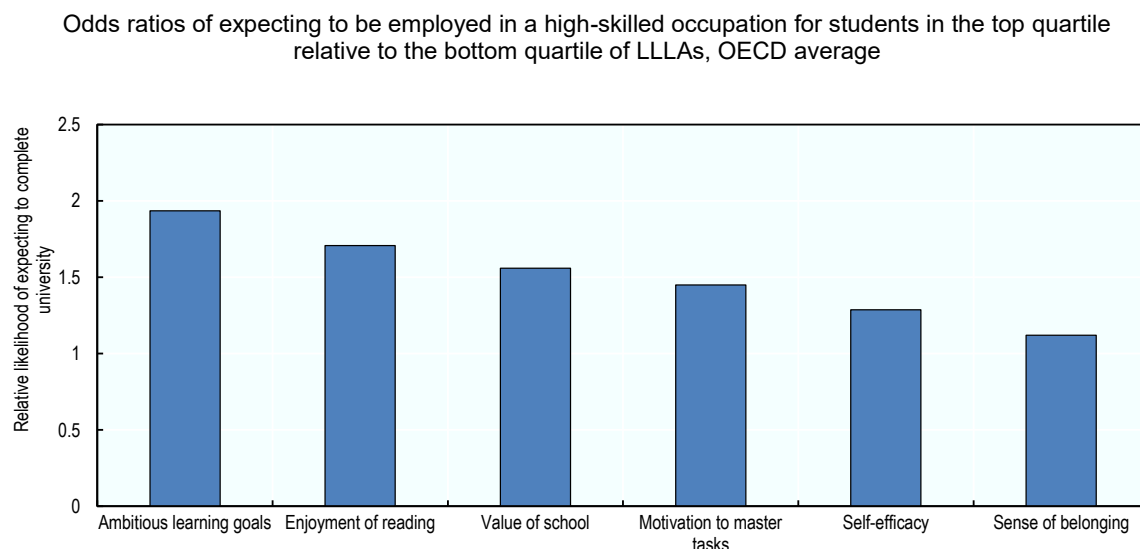
Gaps in the educational expectations of students from different socio-economic backgrounds are observed across all OECD countries. Importantly, the results indicate that with only few exceptions, these gaps shrink significantly when considering students with high levels of enjoyment of reading compared to their peers with weaker levels of enjoyment, even when factoring in students' performance in reading tests as a proxy for their performance in school, their gender and their school's socio-economic background. Very sharp reductions in the gaps are observed in several countries, including Chile, Israel, Italy and Turkey. On the other hand, enjoyment of reading seems to be only mildly associated with decreases in gaps in Austria, Czech Republic, Germany and Hungary – all countries whose education systems do early

tracking, and where expectations may therefore be shaped more by the institutional context than by individual characteristics. A similar picture emerges when decomposing this gap over quartiles of the index of students' ambitious learning goals. In this case, differences in expectations across SES are particularly small in Estonia, Japan, the Netherlands and Turkey.

These results indicate that students who have been encouraged to develop a stronger sense of enjoyment of reading and more ambitious learning goals are more likely to develop higher educational aspirations than their peers with weaker attitudes. They further suggest that these lifelong learning attitudes may help mitigate the otherwise strong influence of socio-economic backgrounds on students' educational expectations.


The association between students' lifelong learning attitudes and their career expectations is, however, more modest. Figure 2.10 depicts the relative likelihood of students with attitudes in the top quartile of indices of lifelong learning attitudes expecting to be employed in a high-skilled (rather than a low-skilled) occupation at the age of 30 relative to students in the bottom quartile. As before, estimates consider a student's age, gender, SES and reading test scores, as well as the school's socio-economic background.

Figure 2.10. Adolescents' expectations to work in a high-skilled occupation at age 30 and lifelong learning attitudes



Note: Bars represent the odds ratios of expecting to work in a high-skilled occupation (rather than a low-skilled occupation) at age 30 for students in the top quartile of LLLAs relative to those in the bottom quartile of LLLAs. Higher values in the odds ratios mean that the probability of expecting to complete university education for students with high values of LLLAs is closer to that of students with low values of LLLAs. Logistic regressions take into account a student's gender, age, reading test scores and SES, and the school's socio-economic background.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/hig2cp>

Unlike students' educational expectations, which are closely related to their attitudes towards learning, career expectations are only mildly associated with lifelong learning attitudes. Only students' learning goals appear somewhat related to their career expectations, suggesting that teenage students are influenced by other factors. For example, the role models to which they are exposed in their family, network and neighbourhood may help explain their career expectations.

Based on the evidence above, acquiring strong lifelong learning attitudes seems essential for developing higher educational expectations and (to a lesser extent) career expectations. A comparison of students from similar backgrounds with similar performance levels in school shows that those with more positive attitudes and stronger dispositions to learn (especially enjoyment of reading and the ability to set ambitious learning goals) tend to develop significantly higher educational expectations than their peers who lack such attitudes. Strong attitudes can also help reduce current gaps in aspirations between SES groups. These findings highlight the importance from a policy-making standpoint of understanding how these attitudes are developed and which interventions can best spur them, particularly among the most vulnerable and disadvantaged students.

Students' development of lifelong learning attitudes

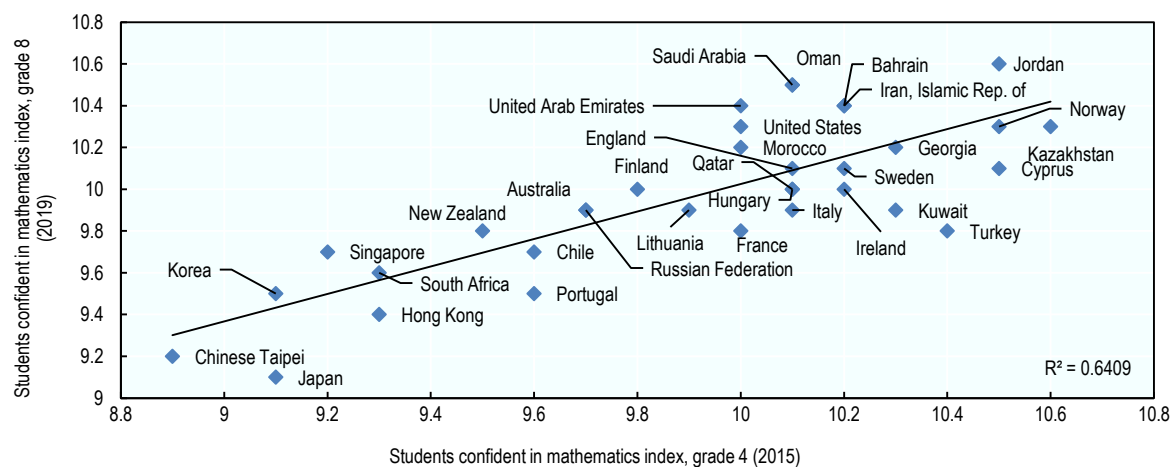
The previous sections have shown that 15-year-old pupils who are endowed with stronger attitudes and dispositions to learn tend to perform better at school. They also develop higher educational and career expectations than their peers with weaker attitudes. This, in turn, could exert a positive influence on their choice to enrol in further education, and on their labour-market outcomes later in life. In the context of the COVID-19 pandemic, students' self-directed learning ability and intrinsic motivation have proved crucial to continue learning at a regular pace, despite the challenges associated with massive online schooling. It follows that gaps in learning progression are likely to arise between students with stronger lifelong learning attitudes and those with weaker attitudes.

Developing strong attitudes and dispositions to learn does not exhaust its benefits in the short run – it is also crucial from a lifelong perspective. Lifelong learning attitudes are usually carried over into adulthood, so that individuals with stronger dispositions to learn are more prone to keep learning throughout their lives. Hence, creating a lifelong learning society means that education policy makers should also focus on early stages of an individual's life, with the aim of creating strong foundations – both in terms of cognitive skills and attitudes towards learning – as fertile grounds for future learning. This requires understanding how education and training systems can incentivise the development of students' lifelong learning attitudes throughout schooling. This particularly applies to students from socially disadvantaged backgrounds, who are less likely to receive support from their families and are more likely to begin compulsory schooling with pre-existing gaps in non-cognitive skills compared to their peers from advantaged backgrounds.

According to the model of skill accumulation proposed by Cunha and Heckman (2008^[6]), non-cognitive skills are cumulative, in that skill development in future stages builds on the stock of skills acquired earlier in life, as well as on prior investments. Viewed through this lens, the lifelong learning attitudes of 15-year-old students', as observed in PISA, may reflect more than simply just the quality of their learning environment at this specific stage. Rather, they may also reflect prior investments, as well as the emotional and social competencies the students had already acquired before entering secondary school.

To illustrate this point, Figure 2.11 and Figure 2.12 compare mean levels of students' enjoyment of mathematics and confidence in mathematics between 4th graders in TIMSS 2015 and continuing with the same cohort of 8th graders in TIMSS 2019 as measured by the indices "Students like learning mathematics" and "Students confident in mathematics" constructed in the Trends in International Mathematics and Science Study (TIMSS). Both figures show a strong correlation between levels of these attitudes in the pools of 4th graders (TIMSS 2015) and 8th graders (TIMSS 2019). More specifically, variations in the attitudes of 4th graders explain more than 70% of the variations in the attitudes of 8th graders.

Figure 2.11. Students' enjoyment of mathematics among 4th graders in TIMSS 2015 and 8th graders in TIMSS 2019

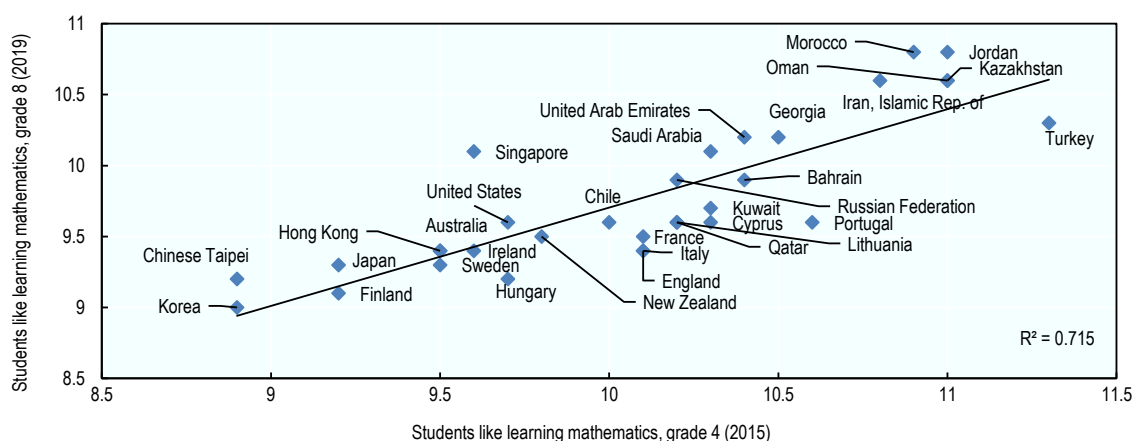


Note: The figure shows the correlation between the “Students like learning mathematics” index computed on 4th graders in TIMSS 2015 and 8th graders in TIMSS 2019.

Source: TIMSS 2015 Assessment Frameworks (2015_[49]), <https://timssandpirls.bc.edu/timss2015/frameworks.html>.


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Figure 2.12. Students' confidence in mathematics among 4th graders in TIMSS 2015 and 8th graders in TIMSS 2019



Note: The figure shows the correlation between the “Students confident in mathematics” index computed on 4th graders in TIMSS 2015 and on 8th graders in TIMSS 2019.

Source: TIMSS 2015 Assessment Frameworks (2015_[49]), TIMSS 2015 International Database, <https://timssandpirls.bc.edu/timss2015/international-database/>.

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This evidence seems to confirm the existence of a strong link between stocks of attitudes that are accumulated at different stages of the education process. Hence, a greater endowment of lifelong learning attitudes in adolescence probably results from both contemporaneous efforts and interventions by teachers

and families, and prior investments. Therefore, education policy makers should design comprehensive strategies targeting different stages of the learning process (starting with early education) to promote positive lifelong learning attitudes throughout schooling. This section focuses on the development of lifelong learning attitudes during adolescence. It analyses the role that schools, teachers and families play at this stage to create favourable conditions for developing lifelong learning attitudes and compensate for gaps accumulated at previous stages.

The role of teachers in stimulating lifelong learning attitudes in secondary school students

Motivating students to become active learners has become a major concern of educators and teachers. Today, high-quality teachers are regarded as teachers who are not just adept at increasing students' knowledge, but can also provide a supportive learning environment promoting critical thinking and spurring children's socio-emotional development (Blazar and Kraft, 2017^[50]).

Previous studies have attempted to shed light on the most effective pedagogies and methods teachers can use to stimulate the development of lifelong learning attitudes, identifying different teacher practices (TPs) that motivate pupils to learn and encourage them to learn autonomously. Some practices relate to individual teachers' personality traits. A study covering primary schools in New York City indicates that teachers' extraversion, conscientiousness and personal efficacy play a significant role in enhancing students' non-cognitive skills (Rockoff et al., 2011^[51]). Similarly, teacher enthusiasm – as communicated by remarking on the value of the learning material, expressing interest in the subject and having an inspiring presentation style – can strongly influence students' intrinsic motivation (Wittrock, 1986^[52]; Long and Hoy, 2006^[53]) and their willingness to learn (Patrick, Hisley and Kempler, 2000^[54]).

Further evidence has shown that students' intrinsic motivation and willingness to learn grows when teachers promote co-operative learning environments (Brophy, 2010^[55]; Vaughn, 2002^[56]; Ghaith, 2003^[57]) and support their need to feel competent and autonomous (Roeser, Eccles and Sameroff, 2000^[58]). When students perceive their teachers as supportive, they are also more likely to engage in academic activities and pursue goals their teachers value (Wentzel, 1999^[59]). Other studies have shown that the tasks teachers assign to students, but also the messages they convey about learning, support their pupils' attitudes (Aunola, Leskinen and Nurmi, 2006^[60]). Creating situations that promote enjoyment of studying can be especially useful in investigating positive attitudes towards learning (Deci and Ryan, 1985^[61]).

Taking stock of the main findings in this literature, this section explores how specific teacher practices relate to the development of the lifelong learning attitudes analysed so far, shedding light on which policy interventions can best create suitable conditions for teachers to develop such pedagogies. Based on data from PISA 2018, this chapter investigates six distinct teacher practices, chosen to reflect some of the practices outlined above - see (OECD, 2020^[8]) for details on index construction. The literature has found these teacher practices to be significantly related to the development of students' lifelong learning attitudes. Information on such practices is based on students' perception of the support they receive from their teachers and their engagement in the classroom.

Teaching practices and lifelong learning attitudes

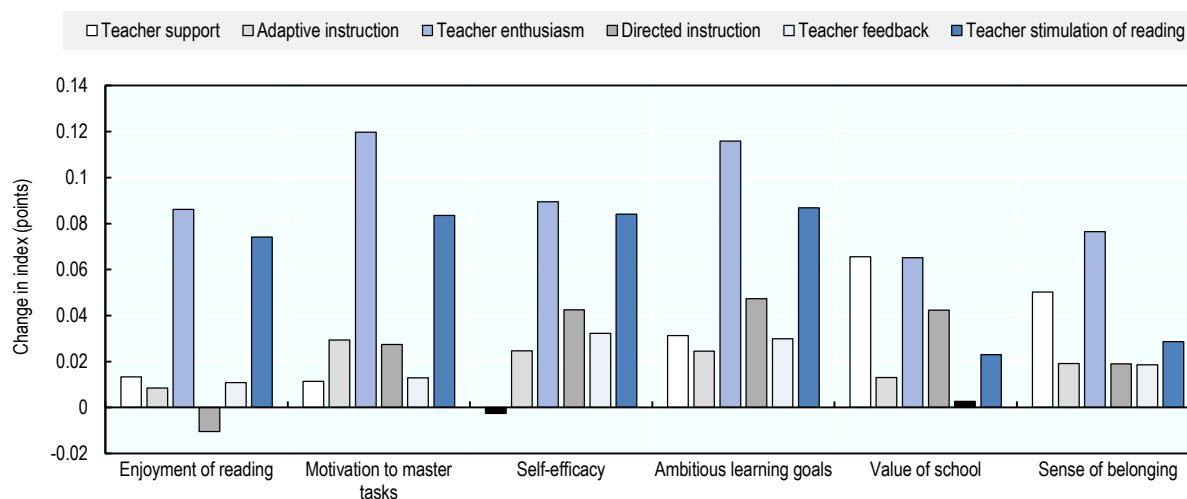
Figure 2.13 shows the correlation between the development of students' lifelong learning attitudes and different teacher practices in the classroom. The results indicate that 15-year-olds' lifelong learning attitudes are positively associated with specific teaching styles, especially teacher enthusiasm and teacher stimulation of reading. The estimates factor in students' SES, age, gender, reading performance and

parental emotional support, as well as the school's socio-economic profile, other teacher practices and the degree of classroom discipline.³

The association between teacher practices varies across lifelong learning attitudes. For instance, while teacher enthusiasm is significantly correlated with all the attitudes considered, it has a particularly strong relationship with students' motivation to master tasks and develop ambitious learning goals, as well as their self-efficacy and enjoyment of reading. Consistently across countries, the results suggest that students display higher levels of lifelong learning attitudes when they perceive their teachers as inspiring and enthusiastic about the material presented in class.⁴

Teacher stimulation of reading is also very tightly linked to most attitudes – e.g. ambitious learning goals, self-efficacy, motivation to master tasks and enjoyment of reading. The index of teacher stimulation of reading measures the extent to which a teacher promotes active learning and classroom participation, as well as enhances students' critical thinking abilities by encouraging them to express their opinions or relate the classroom reading material to their own lives or existing knowledge.

Figure 2.13. Association between lifelong learning attitudes and different teaching practices, OECD average



Note: Regressions take into account student's and school's SES, age, gender, reading performance, parental emotional support, other TPs and disciplinary climate. Regressions are estimated separately for each attitude. Statistically insignificant coefficients at the 5% level are marked in black.

Source: OECD calculations based on OECD (2018_[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The way in which teachers organise the learning material and direct their class – as measured by the index of directed instruction – is also vital to developing students' lifelong learning attitudes. Teacher-directed instruction, where the teacher sets clear goals for learning, asks questions to check whether students have understood the content or presents a short summary of the previous lesson, is found to be statistically associated with students' self-efficacy, ambitious learning goals and the value they attribute to their school.

Teacher enthusiasm and teacher support seem especially important when it comes to developing students' sense of belonging to the school, although associations are modest in the OECD region. Teacher enthusiasm and support, as well as directed instruction, also help students value their school. On the other hand, providing feedback on student performance is only modestly related to most attitudes.

While these results support the view that teacher practices can boost the development of positive attitudes towards learning, great heterogeneity is observed across countries.⁵ The link between teacher practices and students' lifelong learning attitudes is particularly strong in Denmark, Finland, Italy, Sweden and Korea – perhaps because these countries allocate substantial time for regular collaboration among teachers on issues of instruction, e.g. to reflect on experiences and successes in engaging children in the classroom. This is consistent with evidence that teachers are more likely to develop inspiring and enthusiastic behaviours in schools that provide more opportunities to work with colleagues. Most of these countries also build teachers' professional development into their workday, as occurs in more than 85% of schools in Denmark, Finland, Sweden, Norway and Ireland (OECD, 2004^[62]). Research has found that when time for professional development is built into their working hours, teachers are more likely to learn how to cope with particular issues and problems in the classroom. In fact, the evidence shows that job-embedded professional learning is more effective at catalysing changes in teacher practices than generic workshops (Wei, Andree and Darling-Hammond, 2009^[63]).

Teacher enthusiasm

Among all the teacher practices analysed, teacher enthusiasm is linked to a broad range of lifelong learning attitudes. Educational environments where teachers convey enthusiasm towards both teaching and the content of instruction support the development of positive learning attitudes in students, especially ambitious learning goals, motivation to master tasks, self-efficacy and enjoyment of reading.

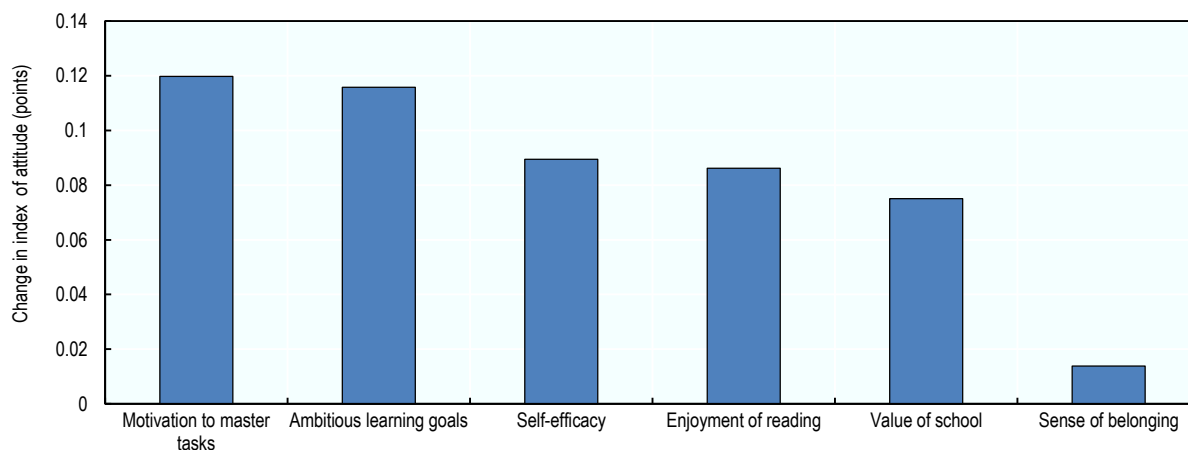
This finding corroborates previous evidence that enthusiastic teachers can improve students' educational achievements and spur the development of positive attitudes and dispositions to learn. The rich literature on the role played by teachers in the development of students' non-cognitive and socio-emotional skills indicates that enthusiasm is one of the most important traits of a good teacher (Witcher, Onwuegbuzie and Minor, 2001^[64]). More specifically, a good teacher creates a sense of enjoyment in the content of instruction, and raises students' curiosity and intrinsic motivation to learn (Patrick, Hisley and Kempler, 2000^[54]; Moè, 2016^[65]). These are all important attributes that can raise the level of effort students devote to learning tasks (Keller et al., 2014^[66]; Kunter et al., 2013^[67]).

When reviewing the mechanisms affecting students' dispositions to learn, the evidence shows that a student's interest in learning is mostly influenced by teachers' dispositional enthusiasm – a construct that comprises positive emotional expressiveness (through animation, body language or facial expression) and positive affect (i.e. the degree of enjoyment and pleasure teachers derive from their professional activities (Keller et al., 2014^[66]). Thus, enthusiastic teachers help their students develop positive subject-related affective experiences and attribute importance to the subject.

Teacher enthusiasm is also strongly and positively correlated with students' performance in school – as measured, for example, by their performance in PISA reading tests (OECD, 2019^[68]). Research has shown this happens indirectly, through the positive influence enthusiastic teachers exert on students' attitudes towards learning, particularly motivation and perseverance (Kunter et al., 2013^[67]), (Keller et al., 2014^[66]).

From a policy-making standpoint, it is important to understand how teacher enthusiasm influences each of the attitudes considered, and how transmission channels can be reinforced and supported in countries or contexts where students struggle to develop strong lifelong learning attitudes. Information in PISA 2018 allows assessing the direction and intensity of the relationships between the different items used to approximate for teacher enthusiasm (ranging from “the enthusiasm of the teacher inspired me”, “it was clear to me that the teacher liked teaching us”, “it was clear that the teacher likes to deal with the topic of the lesson”, to “the teacher showed enjoyment in teaching”⁶) and students' lifelong learning attitudes.

Figure 2.14. Change in lifelong learning attitudes associated with students reporting their teacher is inspiring, OECD average



Note: Estimates represent changes in the index of each LLLA associated with a change in the dummy variable of whether the student perceived the teacher as inspiring. Regressions are estimated separately for each LLLA, taking into account the student's and school's SES, age, gender, reading performance, parental support, other TPs and disciplinary climate.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The results show that in most OECD countries, the positive relationship between teacher enthusiasm and students' lifelong learning attitudes stems in great part from the way teachers inspire students.⁷ Figure 2.14 shows that students who perceive their teacher as inspiring tend to develop more positive attitudes towards learning – particularly more ambitious learning goals, and higher levels of motivation and enjoyment of reading – than their peers who feel less inspired by their teachers. The link between perceived teacher enthusiasm and lifelong learning attitudes is particularly strong in Denmark, Finland, Germany, Norway and Slovenia.

It follows that identifying the right way to support teacher practices that inspire students can greatly help them develop positive learning attitudes (Box 2.4). This is certainly no easy task, as a plethora of potential practices are in principle available to achieve this result. Considering the other items composing the index of teacher enthusiasm, the analysis shows that classroom environments where students perceive that teachers like dealing with the subject are strongly associated with students' motivation to master tasks in Latvia and Portugal,⁸ while the strength of those associations is negligible in other OECD countries.

What can countries do to support effective teacher practices leading to lifelong learning attitudes?

From a policy-making standpoint, it is key to understand how governments can promote beneficial practices and pedagogies – and where such practices already exist, how they can be scaled up so that the majority of students can benefit from them, and all teachers can acquire and use them. Generally speaking, little is known about what makes some teachers more productive than others when it comes to influencing students' achievements and socio-emotional development. Previous literature has highlighted that formal qualifications are only modest predictors of a teacher's contribution to student achievements (Hanushek, 1986^[69]; Hanushek, 1997^[70]). While important, holding full certification, scoring well on teaching exams, having a regular licence or graduating from a selective teacher's college are not sufficient in themselves to explain a teacher's greater ability to influence students' non-cognitive skills (Jackson, 2012^[71]). Rather, teachers' ability to influence the development of students' lifelong learning attitudes is likely bolstered by the support they receive from schools (and education systems more broadly), for

example in the form of coaching or continuous professional development (CPD) programmes to improve teaching practices (Box 2.4).

Box 2.4. The role of continuous professional development for teachers: Evidence from the Teaching and Learning International Survey (TALIS) 2018

Previous work by the OECD in the context of the TALIS programme has recognised that promoting teachers' lifelong learning is an essential instrument to update their teaching practices. Creating a lifelong learning society requires that teachers themselves learn throughout their career. Governments and education policy makers have put much effort into encouraging teachers' participation in continuous professional development activities. Continuous professional development helps teachers develop skills that will benefit both their teacher practices and their students' development by acting on their dispositions, their classroom practices and their beliefs. The continuous professional development activities that most effectively create a shared culture of improvement across teachers are those that are embedded in the school community, thereby incorporating the teaching experience, the school context and teachers' collegiality.

Analyses of the TALIS 2018 survey (OECD, 2019^[72]) have striven to identify the most effective forms of continuous professional development, as perceived by lower-secondary school teachers. Teachers who reported participating in training on pedagogical practices were more likely to implement effective practices in the classroom than teachers who did not take these courses. Similarly, participation in training on classroom management seemed to be associated with higher levels of self-efficacy in the classroom. Asked which characteristics they valued most, teachers who reported that their training had a positive impact on their teacher practices answered that the training: i) provided opportunities to practise/apply new ideas and knowledge in their own classroom; ii) provided opportunities for active learning; iii) provided opportunities for collaborative learning; and iv) focused on innovation in their teaching.

In addition to training courses, coaching is particularly beneficial to improving teacher practices. **Brazil** created a nine-month-long coaching programme (the Ceará programme) for secondary education teachers that taught practical strategies on lesson planning, classroom management and student engagement. The programme also consisted of school-level pedagogical co-ordinators who provided feedback to teachers based on classroom observations, as well as self-help resources such as books and online videos. An impact evaluation revealed that the programme resulted in: i) more instructional time for teachers in the classroom, by reducing the time spent on classroom management; ii) more frequent use of interactive strategies to improve student engagement; and iii) an overall improvement in the academic outcomes of students in state and national tests. In **South Africa**, primary education teachers were visited by coaches, who observed their teaching, provided feedback and demonstrated corrective actions. Evaluations of this intervention showed that teachers who received coaching were more likely to implement group-guided reading (a difficult strategy to put in place), and that their students improved their reading proficiency by a considerable margin. The results also show that a structured pedagogical programme based on in-person coaching helped teachers utilise all the resources available to them and induced behavioural change in their instructional practices.

Source: OECD (2019^[72]), *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners* (Summary), <https://doi.org/10.1787/0d310598-en>.

Previous analyses by the OECD indicated that effective teachers have two things in common: experience and continuous training (OECD, 2019^[41]). Therefore, providing teachers with opportunities for continuous professional development – especially if integrated into their workday – and incentivising collaborative environments with their colleagues can spur the adoption of positive teaching practices in schools (see examples in Box 2.5 and Box 2.6).

Box 2.5. What makes an inspiring teacher: Evidence from the United Kingdom

To identify how teachers inspire their learners, a project in the United Kingdom assessed the most common characteristics shared by 36 selected inspiring teachers. A team of external reviewers observed each teacher for 3.5 hours on average, corresponding to approximately 126 hours of direct scrutiny of the teachers' practices across a wide array of subjects in nursery, primary, secondary and sixth-form classes.

Blaylock et al (2016^[73]) collected the results in a report which suggests that inspiring teachers were able to communicate a sense of their personal joy in learning and discovery by modelling enthusiasm and inquisitiveness as part of their teaching style, and by asking intellectually challenging questions. Teachers also displayed a keen interest in each child's learning, using empathy and frequent classroom interactions as pedagogical tools to diagnose what children needed to reach the next level of knowledge and understanding. Inspiring teachers also differed from other teachers in their exceptionally high expectations for student performance and their commitment to personal improvement in order to achieve this objective. Finally, all teachers shared the desire to be as effective as possible.

Reviewers then identified a number of practices that were particularly effective to support teachers in developing inspiring behaviours. Among them, working with others – e.g. being involved in the evaluation of the others' work or having an inspirational role model to learn from – and continuing professional development related to the improvement of pedagogy have been found to be particularly effective. Inspiring teachers were also benefitting from opportunities to reflect on practice with others within their schools.

Source: Blaylock et al. (2016^[73]), "Inspiring teachers: How teachers inspire learners", <https://www.educationdevelopmenttrust.com/our-research-and-insights/research/inspiring-teachers-how-teachers-inspire-learners>.

Questionnaires administered to school principals through the 2018 PISA survey provide information on the types of measures schools offer teachers to improve their practices and effectiveness, including student assessments of teacher practices, teacher mentoring and school-based continuous professional development programmes.

Many schools rely on student assessments to guide student learning (90% of schools use them for this purpose across OECD countries) and identify aspects of the instruction or curriculum that could be improved (78% of schools). In some countries, including Germany, Italy and the United Kingdom, teachers in schools that use such assessment tools were more likely to adopt instructional practices such as self-directed learning or student feedback.

In a majority of OECD countries, however, teacher mentoring programmes did not spur more widespread adoption of the teacher practices analysed. Luxembourg and Latvia are exceptions, where the existence of teacher mentoring programmes at the school level is positively associated with widespread adoption of practices that stimulate students' reading and teachers' enthusiasm. Another exception is the United Kingdom, where teacher mentoring programmes appear strongly correlated with teachers' directed instruction.

Box 2.6. Best practices: The cases of Finland and Korea

Korea is among the countries where teacher practices are strongly associated with the development of students' lifelong learning attitudes. Many factors could explain this result. First, all teachers are held to high standards, thanks to targeted policies that give teachers a highly respected status in society, along with high wages and positive working conditions (OECD, 2018^[74]). Second, teachers spend only 35% of their working time teaching pupils. They devote the remaining time to continuous professional development and sharing instructional resources and ideas with colleagues (Wei, Andree and Darling-Hammond, 2009^[63]). This is especially helpful for new teachers (Kang and Hong, 2008^[75]), and is generally found to promote enthusiastic and inspiring teacher behaviours (Blaylock et al., 2016^[73]). An additional feature of the Korean education system is its rotation scheme, which transfers teachers to a different school every five years. The rotation exposes teachers to novel challenges, providing them with the necessary tools to adapt and respond rapidly to different children's needs with innovative pedagogies.

Finland is another country where teacher practices appear to promote lifelong learning attitudes very effectively. Many Finnish schools provide substantial time for regular collaboration on issues of instruction: teachers meet every week for one afternoon to jointly plan and develop curricula, and schools in the same municipality are encouraged to share materials and best practices (OECD, 2004^[62]).

Finally, another way to ascertain the value of different teaching strategies is to determine which are more frequently used in the schools where principals are most satisfied with the education staff and compare these results with the schools whose principals are least satisfied (OECD, 2019^[68]). This is done by exploiting the index of staff shortage available in PISA, which measures the extent to which school principals are satisfied with their school's teaching and assisting staff.⁹ Further analysis from PISA 2018 shows that in schools where principals are more satisfied, teachers are significantly more likely to be enthusiastic, to stimulate reading and to support their students.

Importantly, while several schools have undertaken to update teachers' practices and skills, participation in continuous professional development programmes or other trainings is generally uneven across different school types. Teachers in schools with large shares of disadvantaged students are generally less experienced and less engaged with continuous professional development, so that the most effective teachers sort into schools with a prevalence of advantaged students (see Box 2.7 for evidence from PISA 2018). Given that effective teachers may help reduce socio-economic gaps in student performance (and should therefore be assigned to more vulnerable and disadvantaged students), their concentration in schools with higher socio-economic profiles may reinforce social gaps in learning, and should therefore be tackled through targeted policy interventions.

Box 2.7. Sorting experienced teachers across schools

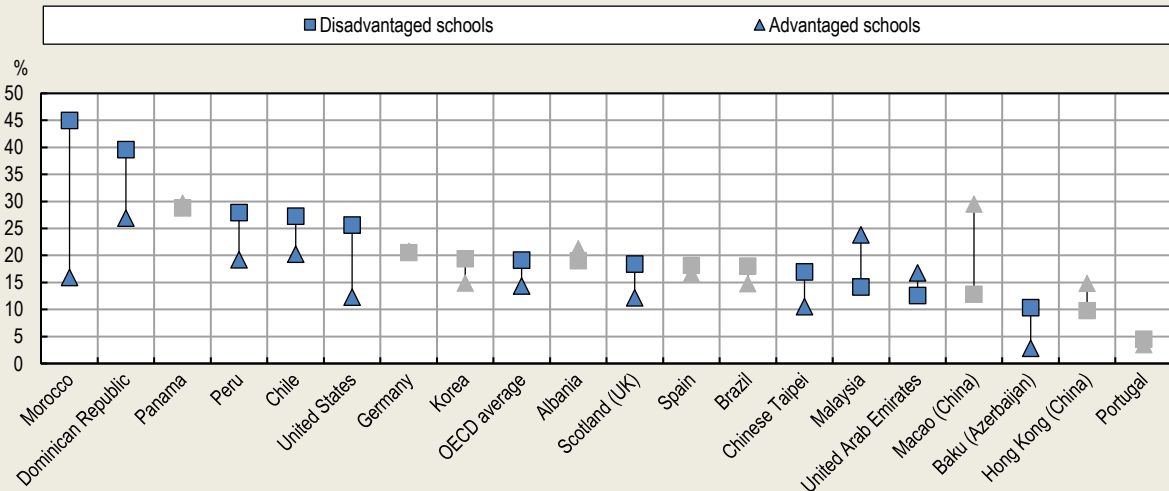
Evidence accumulated through several PISA rounds indicates that the most effective teachers usually have at least two things in common: experience and solid training. Supporting this finding, other studies have shown that each additional year of teaching experience generally corresponds to student achievements, especially during a teacher's first five years in the profession (Rockoff, 2004^[76]). Indeed, early in their careers, teachers often feel less confident in their ability to teach, their classroom management skills and their ability to use a wide range of effective instructional practices (OECD, 2019^[72]).

Attracting the most effective teachers to schools that number many struggling students may therefore be an effective way to compensate – at least partially – for their educational disadvantage. However, evidence from PISA 2018 shows that more experienced teachers (as well teachers with higher qualifications) are unevenly distributed across school types and tend to sort into schools numbering larger shares of students with high SES. This is what emerges, for example, from the analysis of optional teacher questionnaires administered as part of the PISA 2018 survey. Countries that distributed the questionnaire gained information on teachers' professional experience, allowing them to distinguish between “novice” teachers (defined as those with fewer than five years of experience) and more experienced teachers.

In many of the 19 countries/economies that distributed the questionnaire, including Chile, Scotland (United Kingdom) and the United States, the proportion of teachers with fewer than five years of experience was larger in disadvantaged schools than in advantaged schools (Figure 2.15).

On average across the OECD countries that distributed the teacher questionnaire, around 20% of teachers in disadvantaged schools had under five years of experience – a significantly higher proportion (by 5 percentage points) than in advantaged schools. The difference between these shares was particularly large (29 percentage points) in Morocco, where almost one in two teachers in disadvantaged schools had fewer than five years of experience.

Figure 2.15. Percentage of novice teachers, by school's socio-economic profile



Note: Proportion of novice teachers by school's socio-economic profile, measured by the school's average PISA index of ESCS. Disadvantaged schools are the schools in the bottom quarter and advantaged schools are in the top quarter. Statistically insignificant coefficients are marked in grey.

Source: OECD, (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>, Table II.B1.5.5.

StatLink  <https://stat.link/vhkgdu>

Employing mainly less-experienced teachers in schools with high concentrations of disadvantaged students may compound these students' academic difficulties, as novice teachers tend to be less effective than teachers with several years of experience (Rockoff, 2004^[76]). Further evidence from PISA 2018 shows that the countries/economies where the proportion of novice teachers is larger in disadvantaged schools than advantaged schools also present greater socio-economic differences in performance (OECD, 2019^[41]).

Besides experience, participation in ongoing professional development is a crucial component of teacher professionalism. Continuous professional development aims to improve teachers' practices, self-efficacy and job satisfaction. School principals reported that, on average across OECD countries, more than one in two teachers in their school had attended such a programme, but with wide variations between and within education systems. In 18 countries, a smaller proportion of teachers working in schools serving mostly disadvantaged students had attended such a programme than in schools with a more affluent intake.

Source: OECD (2019^[41]), *PISA 2018 Results (Volume II): Where All Students Can Succeed*, <https://doi.org/10.1787/b5fd1b8f-en>.

While the debate on the best ways to help teachers develop good pedagogies and practices is relatively old, the challenges induced by the COVID-19 pandemic, and the widespread adoption of mixed models of schooling combining classroom and remote instruction, have made it even more salient. The pandemic has disrupted instructional practices and presented educators with a huge challenge, i.e. how to adapt their teaching content to distance and online instruction while stimulating children's motivation and enjoyment of learning from a distance. Many countries have rapidly taken action to help teachers overcome the numerous obstacles they are likely to have encountered, such as a lack of suitable digital skills or guidelines on the appropriate pedagogies in such circumstances. Box 2.8 provides some examples of policy interventions.

Box 2.8. How countries have supported teachers during the COVID-19 pandemic

Teachers need support to quickly adapt their instruction practices to distance learning, whether regular or ad hoc. France has mobilised its network of local digital education advisors to support the transition from face-to-face to distant learning. The network has provided online training to teachers and school principals about the availability and use of digital resources for pedagogical practice, and promoted teaching practices adapted to educational continuity and progressive school re-opening. It has also worked with local authorities to lend (and deliver) computers and learning worksheets to all students (Vincent-Lancrin, 2020^[77]).

Other countries are complementing schooling resources and teachers' efforts to deliver high-quality online classes by broadcasting home schooling on television and social media. In the United Kingdom, for example, the British Broadcasting Corporation (BBC) has begun to collaborate with teachers and education experts. It now provides daily lessons to pupils in grades 1 to 10, including videos and interactive activities aiming to keep students motivated and stimulate their socio-emotional skills (Van Lieshout, 2020^[78]).

The role of parents in developing lifelong learning attitudes in youth

Together with teachers, parents play a key role in furthering children's cognitive and non-cognitive abilities. Parental involvement in a child's education starts early in life, continuing through childhood and adolescence. Children of parents who are involved in their development tend to have greater belief in their self-efficacy, stronger intrinsic motivation to learn and higher mastery goals (Bong, Hwang and Song, 2010^[79]; Ginsburg and Bronstein, 1993^[80]).

In this section, "parental" involvement is understood to comprise all parental activities that are intentionally linked to learning (Bouffard and Weiss, 2008^[81]). Parents engage in children's education in various ways, from being actively involved in their schooling at home (e.g. helping them with homework, discussing their

experience at school, reading with them or telling them stories), to participating in scholastic activities (e.g. communicating with teachers about their child's progress or volunteering in school activities) (Avvisati, Besbas and Guyon, 2010^[82]). Parental involvement also includes behaviours and practices such as setting and conveying high expectations for their children's educational achievements and goals (Fan and Chen, 2001^[83]).

In 2018, in addition to the student and school questionnaires distributed in every country participating in the PISA survey, countries were given the opportunity to voluntarily disseminate to parents a questionnaire covering (among other things) their involvement and reading habits. Nine OECD countries distributed the parental questionnaire: Belgium, Chile, Germany, Italy, Ireland, Luxembourg, Mexico, Portugal and Korea.

This section explores how parental involvement supports the development of students' lifelong learning attitudes, using the information collected through the PISA 2018 parental questionnaire. It focuses on different indices of parental involvement: i) home involvement (academic), e.g. helping children with homework; ii) home involvement (non-academic), e.g. discussing political or social issues with children, spending time with them or going with them to bookshops and libraries; and iii) school involvement, e.g. participating in local school government and holding discussions with teachers on how best to support home learning at home (details on their construction see (OECD, 2020^[81])). This section also focuses on parents' emotional support, a construct that comprises a set of parental behaviours intending to bolster their children's confidence when facing difficulties, and to support their educational efforts and achievements.

While the development of students' attitudes and dispositions to learn starts in the first years of life, this section focuses on parental support and engagement during adolescence. Although cognitive skills tend to be settled in the first ten years of life, socio-emotional and motivational skills and attitudes are still malleable at later stages of an individual's educational career (Cunha and Heckman, 2008^[6]), which is why it is important for parents to continue supporting and accompanying their children's learning during adolescence. Box 2.9 and Box 2.10 present some evidence underscoring the importance of parental interventions at earlier moments of a child's education to underpin later learning.

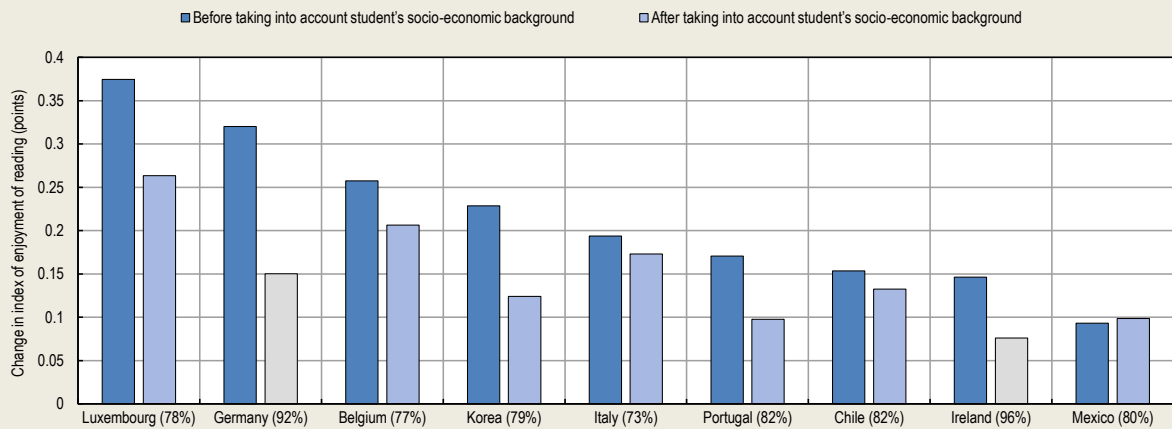
Box 2.9. Correlation between parental support at the beginning of primary school and students' enjoyment of reading in adolescence

The PISA 2018 parental questionnaire asked parents to report on their engagement in different activities with their children during the first year of primary school. For example, parents stated how often (i.e. never or hardly ever, once or twice a month, once or twice a week, every day or almost every day) they read books to their children, told them stories, sang songs with them, played with alphabet toys or played word games, and discussed their school activities with them. This information provided an indication of parental support during children's early education.

Analyses of these data indicate that some of these early parental practices (particularly reading books to young children) display strong associations with students' enjoyment of reading measured at age 15. Figure 2.16 shows the association between reading books frequently to children in primary school and the students' enjoyment of reading at age 15. Bars represent the difference in the mean value of the index of enjoyment of reading between students whose parents read books to them weekly or daily when they were in primary school, and students whose parents did not. Numbers in brackets represent the shares of parents who often read books to their children in primary school. Estimates are shown before and after factoring in the student's socio-economic background.


Figure 2.16. Students' enjoyment of reading at 15 and parental support in primary school

Difference in mean index of enjoyment of reading at age 15 between students whose parents used to read books with them often (daily or weekly) and those whose parents did not, for a subset of OECD countries



Note: Bars report the difference in the index of students' enjoyment of reading between students whose parents often read books to them (weekly or daily) in the first year of primary school and students whose parents did not. Estimates were done before and after factoring in students' SES. In both cases, regressions factor in a student's age and gender. The estimations were done only on the subset of OECD countries that participated in the parental questionnaire. Bars in grey report coefficients that are not significant at the 5% statistical level. Values under brackets report the share of parents who read books to their children often in early primary school.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The parents' responses show a close relationship between their own involvement in reading books to their child during the first year of primary school and the child's enjoyment of reading at age 15. Students whose parents reported they read a book with their child daily or weekly have markedly higher levels of enjoyment of reading than students whose parents read to them less regularly. The average difference across the nine countries for which data are available is 0.22 points (almost one-fourth of a standard deviation). However, this gap varies considerably across countries, ranging from 0.09 points in Mexico to 0.38 points in Luxembourg.

Differences in the development of attitudes associated with early parental involvement partly mirror differences in parents' socio-economic backgrounds, as students from more-advantaged backgrounds tend to receive more support from parents. However, even when comparing students with similar SES, there remains a sizeable gap in the level of enjoyment of reading between students whose parents engaged more in their early learning and those whose parents did not. When factoring SES into the regressions, the gap amounts to 0.15 points on average. These associations suggest that parental support proffered in early phases of a child's life may have a lasting influence on the development of specific student attitudes.

Box 2.10. Why is intervening in early childhood so important?

The cognitive and socio-emotional skills acquired in the first five years of a child's life have crucial and long-lasting impacts on later outcomes. While the quality of schooling matters, strong early learning accelerates later development, whereas a poor start can inhibit it. In fact, children who have not developed core foundation skills by the age of 7 typically struggle to make good progress at school, and are more likely to have social and behavioural difficulties throughout adolescence and adulthood. Hence, it is essential to understand which factors can facilitate effective early learning, and the role of parents in promoting these factors.

Protective factors that support children's development during this phase include regular, warm and stimulating interactions with their parents and other caregivers. Risk factors that impede development include exposure to stresses, such as violence in the home and poor nutrition. Children who experience supportive early learning environments develop rapidly, establishing a sound base for both ongoing and future learning and achievement.

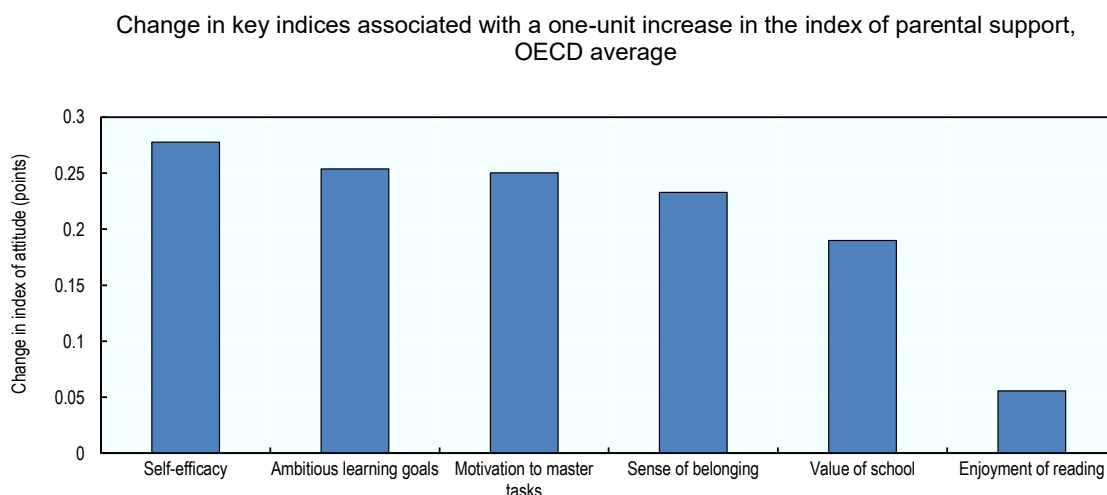
A growing body of longitudinal evidence tracking children from preschool to adulthood has consistently found a significant relationship between early experiences and later outcomes. Children who do not develop critical early skills, such as emergent literacy or self-regulation, struggle greatly to achieve learning goals at school and positive outcomes during adulthood. Importantly, the attitudes and personal attributes that are developed in these early years are generally long-lasting. Aspects of self-regulation (such as attentiveness and task persistence) developed at this stage tend to persist, and are positively associated with achievement in reading and mathematics throughout primary school.

As the first five years of life are such a critical time for developing long-lasting attitudes and foundation skills, understanding what practices can stimulate effective early learning is paramount. Previous findings from the OECD have shown that strong home environments provide a great start for every child (Borgonovi and Montt, 2012^[84]). In addition to parental education and SES, parenting behaviours and parental well-being largely contribute to children's experience of the home environment, and are therefore crucial to their early-learning outcomes. The activities parents perform with their children, such as reading to them and engaging them in warm and responsive interactions, combined with the frequent use of complex language, create a home learning environment that supports children's development of cognitive skills, self-regulation and social-emotional skills, as well as their sense of well-being.

Source: OECD (2020^[85]), *Early Learning and Child Well-being: A Study of Five-year-Olds in England (United Kingdom, Estonia, and the United States)*, <https://doi.org/10.1787/3990407f-en>.

Parental emotional support and the development of lifelong learning attitudes in students

Figure 2.17 shows the average association across OECD countries between parents' emotional support and students' attitudes and dispositions to learn, factoring in the student's age, gender and SES, and the school's socio-economic profile. The results suggest that higher levels of parental emotional support, as reflected in parental behaviours that support children's efforts and encourage them to be confident, are strongly related to all the lifelong learning attitudes. The only exception is students' enjoyment of reading,¹⁰ where the association is modest.

Figure 2.17. Students' lifelong learning attitudes and parents' emotional support

Note: Bars represent changes in the indexes of LLLAs associated with a one-unit increase in the index of parents' emotional support. Regressions take into account students' and schools' socio-economic backgrounds, age and gender. All changes in the index are statistically significant at the 5% level.

Source: OECD calculations based on OECD (2018_[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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A particularly strong association is observed between the index of parental emotional support and the indices of self-efficacy, learning goals, motivation to master tasks and sense of belonging to the school community. More precisely, a one-unit increase in the index of parental support is associated with a 0.25-point increase in these indices.¹¹ These associations are particularly strong in Korea across all lifelong learning attitudes, possibly reflecting the effectiveness of different initiatives recently implemented by the Ministry of Education, Science and Technology to include parents in their children's education (Box 2.11).

The association between parental emotional support and student self-efficacy is also strong in Sweden, the United States and Turkey. The relationship between parental emotional support and students' learning goals is especially strong in Sweden and Norway.

Box 2.11. Korea: School support for parental involvement

In Korea, the Ministry of Education, Science and Technology has put in place a comprehensive system to reinforce parental participation in children's education. The initiatives include school monitoring programmes (where parents visit their children's school to gain a sense of its activities and curriculum, and provide feedback), as well as parental support centres (OECD, 2014_[86]). All these initiatives aim to help parents understand their children's progress, become more aware of school resources and get involved (e.g. by joining a parents' group) (OECD, 2012_[87]). Parental support centres and educational institutions in each region also offer training to help parents improve their parenting skills (e.g. in communication and career guidance).

These initiatives have likely increased parents' commitment to education, as reflected in high financial investments in their children's schooling. OECD (2012_[88]) indicated that total spending on private tutoring accounts for 7.9% of the average household disposable income, meaning that parents with three children might spend one-quarter of their income on private tutoring.

Box 2.12. United States: The National Network of Partnership Schools

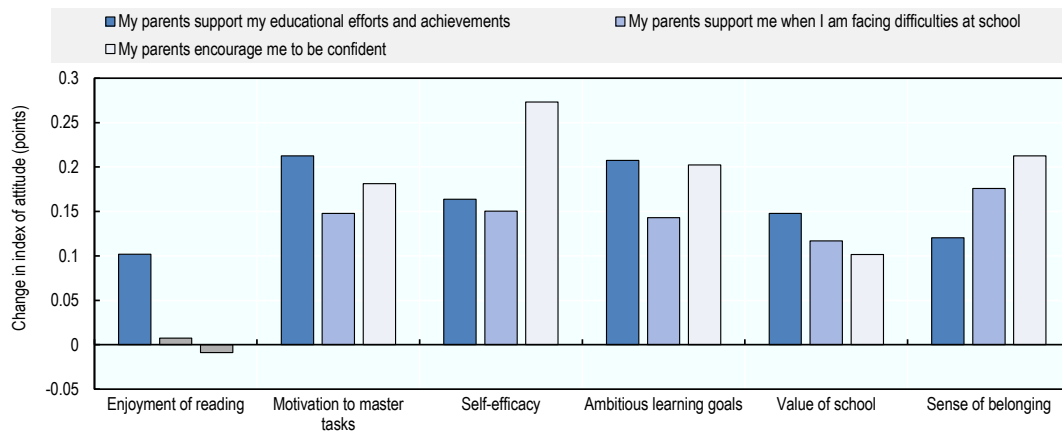
Established at Johns Hopkins University in 1996, the National Network of Partnership Schools invites schools, districts, states and organisations to use research-based approaches to organise and sustain excellent family and community involvement programmes aiming to increase student success in school.

The network has promoted several initiatives to this end. The Teachers Involve Parents in Schoolwork Interactive Homework partnership programme, for example, covers elementary and middle grades. Its activities typically consist of homework (in reading, maths or science) assigned to students according to the material they have learned in the classroom and requiring interaction with a parent at home. Parents are not asked to teach school subjects. Rather, they are required to discuss with their child how specific skills acquired in school are used in the real world, and to add questions or comments for the teacher in the section called “Home-to-School Communication”. The aim of this programme is to improve parental engagement in children’s education and strengthen school-parent communications.

Source: National Network of Partnership Schools Johns Hopkins University. (n.d.^[89]), National Network of Partnership Schools website, www.partnershipschools.org.

Figure 2.18. Students’ lifelong learning attitudes and different forms of parental emotional support

Change in key indices associated with dummy variables of whether parents adopt different forms of emotional support, OECD average



Note: Bars represented differences in the values of attitudes associated with dummy variables corresponding to whether parents provide or not different forms of emotional support. Regressions take into account the PISA index of student’s and school’s SES, age and gender. Bars in grey indicate coefficients that are not statistically significant at the 5% level. Regressions are estimated separately for each LLLA.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The results reported in Figure 2.18 above show a strong and positive relationship between the emotional support provided by parents and students’ development of lifelong learning attitudes. However, they do not reveal why this relationship exists, and which forms of emotional support are especially important to developing lifelong learning attitudes. Understanding which forms of emotional support are the most suited to stimulate students’ attitudes and dispositions to learn is an essential component of education policy making. The results in Figure 2.18 present evidence on the specific forms of parental emotional

support influencing the development of positive lifelong learning attitudes among children, focusing separately on the factor items used to construct the index of parental emotional support. The factors analysed cover the extent to which parents encourage their children's educational efforts and achievements, support them when they are facing difficulties at school and encourage them to be confident.

The results show that all types of parental support positively correlate with students' lifelong learning attitudes. In particular, students are more likely to develop strong self-efficacy, motivation to master tasks and a sense of belonging to the school community when their parents encourage them to be confident. On the other hand, students' learning goals and beliefs that school is important are mostly influenced by parental support of their efforts and educational achievements.

These results indicate that parental emotional support may stimulate student attitudes such as self-efficacy, motivation and learning goals. Empirical studies have shown that students tend to form and adjust their self-efficacy beliefs by interpreting and weighting verbal messages communicated by significant others (such as parents or teachers), or emotional and affective states (Bandura, 1986^[90]; Usher, 2009^[91]). For example, they tend to develop positive self-efficacy beliefs when parents believe in their capabilities (Bandura, 1997^[92]) and value their performance (Bong, Hwang and Song, 2010^[79]). Self-efficacy beliefs towards specific academic tasks are also shaped by the learning environment in which children are raised. Learning contexts that encourage and celebrate progress and effort, usually strengthen students' self-efficacy, unlike contexts that emphasise competition (Roser, Midgley and Urdan, 1996^[93]; Greene et al., 2004^[94]).

The learning environment in which children grow up can also shape their learning goals. For example, parents who maintain a firm stance on the value of learning and mastering tasks can encourage students to adopt mastery goals (Bong, Hwang and Song, 2010^[79]). Additionally, when pupils believe their parents support their educational successes, they are more likely to enjoy learning in school and develop well-defined learning goals (Wentzel, 1998^[95]). Finally, parents who celebrate good grades and support learning autonomy can boost their children's intrinsic motivation (Ginsburg and Bronstein, 1993^[80]).

While providing emotional support to children is certainly important, other forms of parental involvement that are more closely related to schoolwork and the content of instruction could further shape students' lifelong learning attitudes. The information collected through the parental questionnaire reveals three distinct forms of parental involvement:

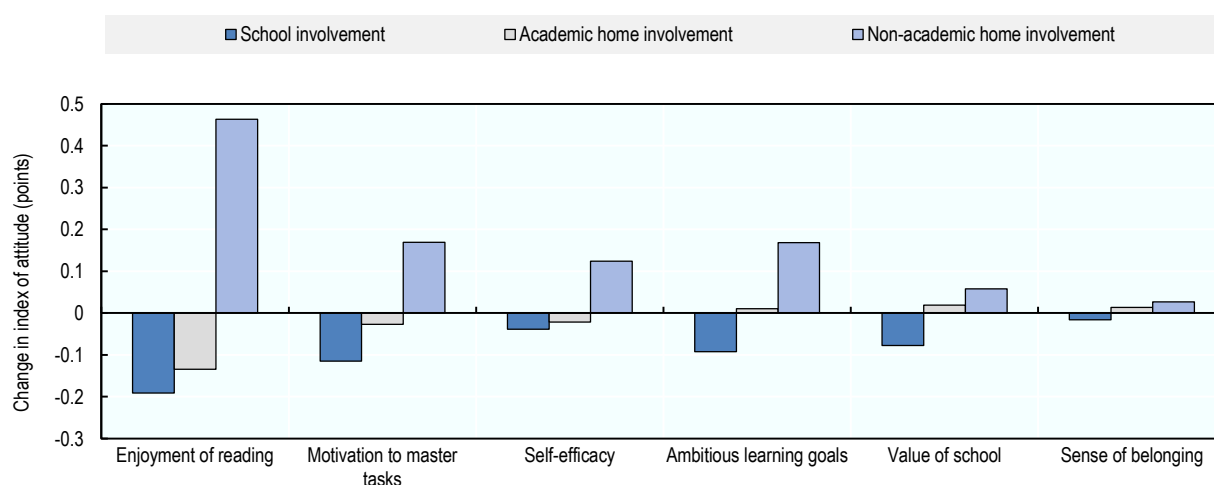
- *School involvement* measures how much (and how often) parents discuss their children's behaviour and progress with teachers, participate in local school government and school activities, and talk to teachers about how they can best support their children's learning at home.
- *Academic home involvement* measures the extent to which parents help their children with homework and discuss with them their progress at school.
- *Non-academic home involvement* measures how much time parents spend talking to their children, discussing political or social issues, going to bookstores or libraries, or questioning their children about what they read for their own pleasure.

Figure 2.19 shows the association between parental involvement and the development of students' lifelong learning attitudes. Estimates represent changes in the index of each LLLA associated with a one-unit increase in each of the indices of parental involvement after controlling for a student's age and gender, as well as the student's and school's SES. Only non-academic home involvement displays a positive association with most lifelong learning attitudes. The association is particularly strong with students' enjoyment of reading, suggesting that students whose parents are more prone to engage in social and political discussions, and spend more time talking with them, develop a stronger enjoyment of reading than their peers whose parents are less involved. On the other hand, the association of parental involvement with students' motivation to master tasks, self-efficacy and learning goals remains limited.

Neither academic home involvement nor school involvement seem to lead students to develop stronger attitudes. Rather, these two forms of parental involvement are sometimes even negatively related to students' attitudes. This result should, however, be interpreted with caution. On the one hand, it could hide potential reverse causality: some adolescents may be receiving more active parental support with their homework or through frequent meetings with teachers because they have poorer abilities or are particularly vulnerable, and therefore need more help. On the other hand, these indicators may be capturing only the quantity – rather than the quality – of parental support. And yet previous literature has highlighted that the quality of parental involvement in homework matters more than its quantity in terms of student outcomes. Accordingly, parental help with homework that is perceived as supportive generally has positive effects on students' achievements, whereas help that is perceived as intrusive has negative effects (Moroni et al., 2015^[96]).


Figure 2.19. Students' lifelong learning attitudes and different forms of parental involvement in school activities

Change in key indices associated with dummy variables of parental involvement, OECD average



Note: Calculations performed on the sample of countries with available data in the PISA parental questionnaire for a subset of countries. Regression controls include the PISA index of student's and school's SES, age and gender. Bars in grey indicate coefficients that are not statistically significant at the 5% level.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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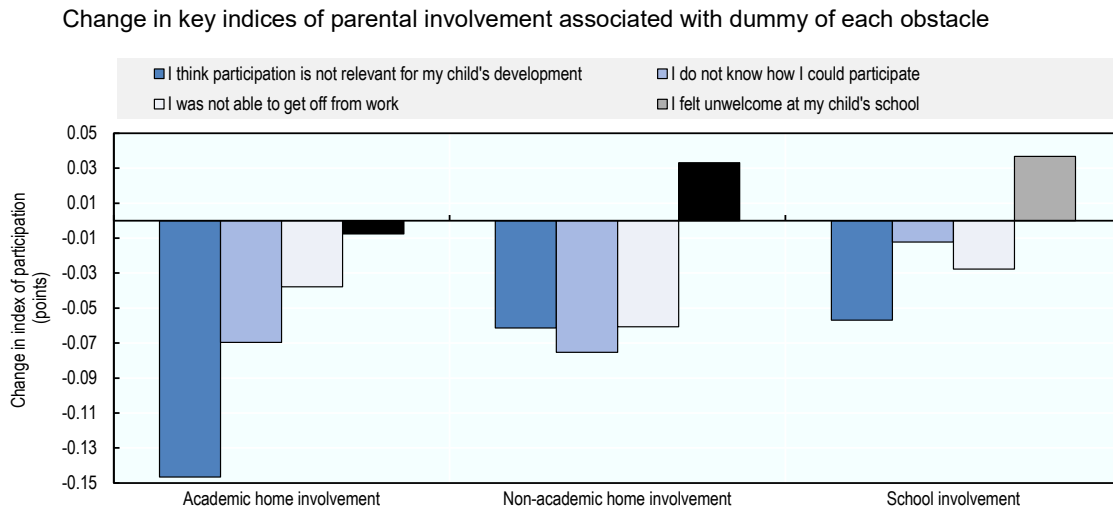
What can countries do to spur parental involvement?

Given its importance in promoting positive learning environments that stimulate the development of strong lifelong learning attitudes throughout childhood and adolescence, policy makers need to understand which actions promote greater parental involvement in children's education – and importantly, which obstacles hinder parental involvement.

Several obstacles may stand in the way of parental engagement. Many parents juggle competing demands at work and at home, and these time constraints may be especially acute for single parents. Other parents – especially those with low education levels – may also hesitate to engage with their children's schoolwork because they lack the necessary skills or familiarity with the topic. They may also have negative attitudes towards the material, which they could communicate to their children.

The information contained in the PISA 2018 survey makes it possible to analyse the extent to which parents perceive such factors as obstacles to participating in their child's education. In the PISA parental questionnaire,¹² parents are asked the following question: "During the last academic year, has your participation in activities at your child's school been hindered by any of the following issues?". They must respond by selecting items from a list of plausible factors, including "the meeting times were inconvenient", "I was not able to get off from work", "I had no one to take care of my child/children", "the way to school is unsafe", "my language skills were not sufficient", "I think participation is not relevant for my child's development" and "I do not know how I could participate in school activities".

Figure 2.20. Main factors hindering parents' involvement in school activities



Note: Calculations performed on the subsample of countries participating in the PISA parental questionnaire (i.e. Belgium, Chile, Germany, Ireland (United Kingdom), Italy, Korea, Luxembourg, Mexico and Portugal). Estimates represent the changes in the indices of parental involvement associated with changes in the dummy variables of whether parents reported their participation was hindered by each specific factor. Regression takes into account for the PISA index of the student's SES, age, immigrant status and parental education. Estimates come from the same regression. Bars in black indicate that coefficients are not statistically significant at the 5% level.

Source: OECD calculations based on OECD (2018_[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/gof9wk>

The results in Figure 2.20 indicate that parents who believe their involvement is not relevant to their child's development are significantly less likely to help their children with academic tasks at home, such as doing homework or discussing how well they are doing at school. Parents' beliefs that their participation is not relevant to their child's development display a particularly strong association with lower academic involvement in Belgium, Germany and Italy.

Parents who report a lack of knowledge and information on how to participate in their children's schooling or underestimate the importance of participation are also less likely to engage with their children at home, as reflected in lower levels of the indices of academic and non-academic home involvement. They are less likely to participate in their children's academic tasks, discuss political or social issues with them, ask them about what they read for pleasure, or accompany them on visits to bookshops or libraries. Time constraints appear to be only mildly associated with all forms of involvement.

These results are somehow consistent with psychological theories of parental involvement which hold that parental role construction is an important driver of involvement decisions. Parents generally engage with their children's education activities – especially at home – when they consider it is their role and believe that their involvement can exert positive influence on their children's educational outcomes (Hoover-

Dempsey and Sandler, 1995^[97]; Reed et al., 2000^[98]). Similarly, parents' participation in school activities is typically higher when schools and teachers invite them to participate (Deslandes and Bertrand, 2005^[99]; Green et al., 2007^[100]).

Increasing parental participation, both at earlier stages of a child's education and through adolescence, therefore requires interventions that act on parental role construction, and strengthen links and communications between schools and parents – e.g. through more frequent invitations to participate in school activities (Hoover-Dempsey and Sandler, 1995^[97]). These concerns have already been addressed through specific policy interventions in several OECD countries (see Box 2.12 and Box 2.13).

School policies and parental involvement in children's education

Many schools across OECD countries have already launched initiatives to strengthen school-parent links, with the aim of encouraging parents to become involved in their children's education and adopt supportive behaviours towards their children's learning. Evidence of the effectiveness of these initiatives is scant. However, some insights can be gained by exploiting the PISA 2018 questionnaire administered to parents and school principals, which collects information on the types of interventions devised by schools to involve parents in their children's education.

For example, the index of school policies for parental involvement is based on parents' answers to a set of questions covering the extent to which their children's school facilitated communication with families, involved parents in its decision-making process, offered parental education, informed families on the best ways to help students with homework and school activities, and co-operated with community services to strengthen school programmes and student development (Annex A.1 of PISA 2018 Volume III provides the methodological details (OECD, 2019^[68])).

Figure 2.21 shows the differences in levels of parental involvement and emotional support (expressed in percentages to facilitate comparability among indicators with different scales) for students who attend schools in the top quartile vs. the bottom quartile, according to the index of school policies for parental involvement. Parental involvement seems significantly more widespread in schools that are implementing more initiatives to involve parents than in schools that offer fewer opportunities for families. The association is particularly strong with parental school involvement and (to a lesser extent) parental emotional support.

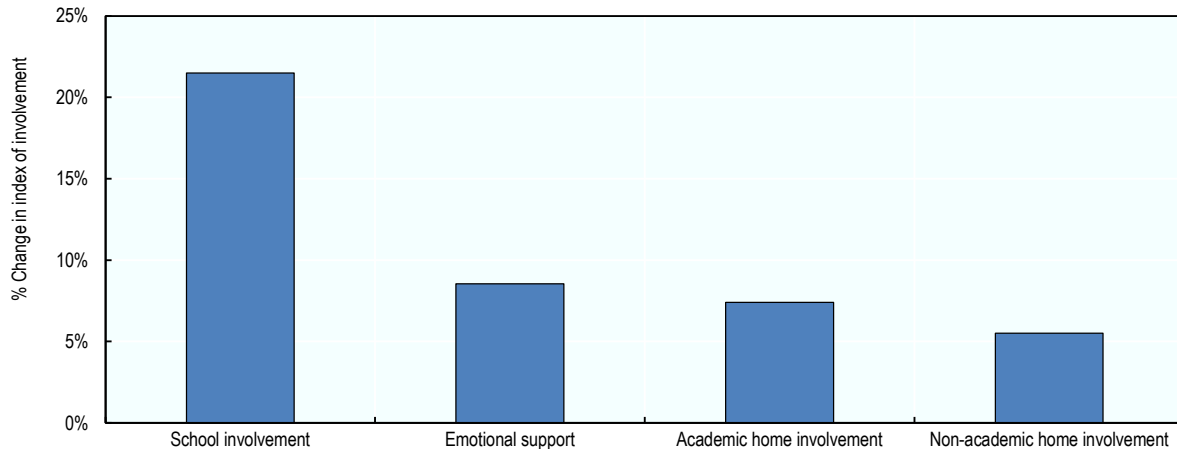
Further investigation of the data indicates that most of these associations across all forms of involvement occur through school initiatives that provide information to parents on how they can best support their children's learning. In schools that launched such initiatives, parents are significantly more likely to engage with their children's activities at home and provide higher levels of emotional support than in schools that do not. Providing parents with opportunities for education and training is also very positively linked to their children's academic tasks at home.

Previous studies have also documented that school staff who display positive attitudes towards students' families and communities promote parental empowerment and involvement. Schools' commitment to working effectively with families (e.g. engaging parents in meaningful roles and offering substantive, specific and positive feedback on the importance of parental contributions) has been identified as a critical component of effective school practices (Hoover-Dempsey et al., 2005^[101]). The evidence also shows that parents respond well to teachers' invitations to become involved. Teacher invitations and school programmes are particularly effective in raising home and school-based participation, because they respond to parents' expressed need to know how to support their children's learning, and assure them that their efforts are useful and valued (Epstein and Van Voorhis, 2001^[102]).

School interventions may therefore help address some of the main issues encountered by parents when engaging with their children's learning, thereby increasing parental involvement. Box 2.13 documents a successful programme involving parents in the French suburbs.

Figure 2.21. School policies for parental involvement and levels of parental support

Percentage difference in key indices of parental involvement and emotional support between students attending schools that score in the top quartile vs. the low quartile of the index of school policies for parental involvement



Note: Each bar represents the percentage difference in key indices of involvement or emotional support between parents whose students attend schools in the top and bottom quartiles of school policies for parental involvement. Calculations are performed on the subset of countries that participated in the parental questionnaire. Regressions take into account students' age, gender and SES, as well as the school's socio-economic background. All coefficients are statistically significant at the 5% level.

Source: OECD calculations based on OECD (2018^[15]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/zkod25>

Box 2.13. The case of France: Effective school policies supporting parental involvement

In 2008/09, a field experiment was conducted among French middle schools in the educational district of Créteil, which includes all the suburbs located east of Paris. The interventions targeted disadvantaged families. This district – an urban and suburban area with the highest density of immigrant populations in France and some of the most deprived areas in the Paris region – tested a programme aiming to improve parental involvement in school, as it was strongly perceived that disadvantaged parents had inadequate knowledge of and confidence in schools. The programme targeted families of children in the 6th grade (i.e. 11-year-olds), the entry grade in middle school. Families were randomly invited to attend a sequence of three meetings with the school head, organised every two or three weeks and lasting two hours each. The first two meetings provided parents with precise guidelines on how to help their children and participate in their education, both at school and at home. The last session, which took place after the first class council and end-of-term report card, offered parents advice on how they could adapt to the results of the first term. Parents were encouraged to ask questions, explain their problems and share their own experiences. The meetings were framed as “discussions” – both between school representatives and parents, and between parents – rather than “information sessions”. At the end of the third session, participants were asked whether they wanted to attend additional sessions covering parenting issues (following up on the first three meetings/discussions) or the use of (school-related) internet, or sessions specifically designed for parents who were not fluent in French. Exploiting a robust experimental setting, evaluations of the programme found that it significantly improved parental attitudes and increased levels of parental involvement, both at home and at school. Over the course of a school year, the programme produced

a net improvement in the behaviour and attitudes of children whose parents were invited, as well as among all other children belonging to the same class. Conversely, no gains on achievements tests were observed for pupils whose parents were in the control group, and therefore did not participate in the meetings. The existence of spillovers on non-treated children provides a positive argument for implementing this kind of policy as it extends at least some of the benefits (namely lifelong learning attitudes) to all children, even though only a fraction of all parents are actually involved. The programme cost between EUR 1 000 and EUR 1 500 per school (i.e. EUR 8-12 per student).

Source: Avvisati, F. et al. (2014^[103]), "Getting parents involved: A field experiment in deprived schools", <https://doi.org/10.1093/restud/rdt027>.

Parental support for home schooling in the context of the COVID-19 pandemic

The role of parental involvement in children's learning has grown in the context of the COVID-19 pandemic. During home schooling, parents are required to engage significantly more than usual in their children's academic activities. Parents must ensure that their children follow the curriculum, supervise their learning without a teacher in attendance, support them emotionally, and sustain their motivation and goals in a situation where they might easily become discouraged from learning autonomously.

Parental involvement during this phase has been crucial in helping students address the main challenges posed by online learning, and spurring their active and autonomous learning. However, many obstacles may hamper their effective engagement. They may struggle to engage in their children's schoolwork while performing their job or other family obligations, a challenge that may be especially acute for single parents. Parents may also feel incapable of supporting their children owing to a lack of digital skills or familiarity with the content, or negative attitudes towards the material. Differences in parents' educational levels may create further inequalities in educational attainments, which should be of great concern to policy makers.

A recent study from the Netherlands has shown, for instance, that less-educated parents have been less supportive of their children's efforts during the lockdown, partly because they feel less capable of helping them (Bol, 2020^[104]). Parents with low education may also hold negative attitudes towards learning and underestimate the importance of supporting their children's skill development, so that they help them less than highly educated parents. Another concern is that gender differences in maths attitudes and achievements can deepen during home schooling, when mothers are the main parent helping many children with schoolwork (Del Boca et al., 2020^[105]; Farré and González, 2020^[106]; Sevilla and Smith, 2020^[107]). Yet many women have high levels of mathematics anxiety, and previous research has shown that girls may internalise this anxiety when exposed to it through adult women (Beilock et al., 2010^[108]). Box 2.14 describes some rapid actions governments have implemented to help families deal with these challenges while adapting to distance schooling.

Box 2.14. Supporting parents when schools are closed: Policy practices across OECD countries

Based on the difficulties encountered by working parents in caring for their children and helping them with schoolwork while performing their job obligations, most OECD countries have intervened to extend family leave opportunities. In Slovenia, working parents who are unable to reconcile work and family obligations are entitled to up to three months of leave, paid by the government at 80% of their wages. In Germany, parents of children under 12 years of age are entitled to 6 weeks of paid leave at 67% of their earnings, up to a ceiling of EUR 2 016 per month. In the United States, under the Families First Coronavirus Response Act, parents with children under 18 whose school has closed are entitled to up to 12 weeks of family leave, paid at two-thirds of their earnings, up to a maximum of USD 200 per day and USD 12 000 for the duration. Other countries – e.g. Canada, France, Italy, Switzerland and the United Kingdom – have put in place similar provisions and will maintain them while schools remain closed. Such measures are crucial to allow parents to stay involved in their children’s learning while preserving their jobs.

Providing information to parents about how they can best support their children’s learning may also improve educational outcomes, both during a lockdown and under normal conditions. Wide Open School, a web platform created in the United States, offers resources for educators and families of students from preschool to upper-secondary education. Some of these resources aim to develop disciplinary and technical skills, along with creativity and critical thinking. Other resources help lower-income families secure electronic devices and better broadband internet, or provide guidance on social-emotional well-being. Beyond offering access to curated resources, the platform also suggests a daily schedule to help students and families maintain a good balance of activities (Vincent-Lancrin, 2020^[109]).

Education systems have also intervened to strengthen school-parent links by providing parents with appropriate information and guidance on practices that will help them support their children’s learning. In Latvia, the educational television channel Tava Klase delivers high-quality educational material tailored to different age groups (van der Vlies, 2020^[110]).

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Annex 2.A. Supplementary tables

Annex Table 2.A.1. List of online tables for Chapter 2

Table number	Table Title
Attitudes and performance in reading, science and mathematics	
Table 2.1	Score-point difference in performance in reading between students in the top vs. bottom quartile of enjoyment of reading, motivation to master tasks and self-efficacy
Table 2.2	Score-point difference in performance in reading between students in the top vs. bottom quartile of ambitious learning goals, value of school, sense of belonging
Table 2.3	Score-point difference in performance in science between students in the top vs. bottom quartile of enjoyment of reading, motivation to master tasks and self-efficacy
Table 2.4	Score-point difference in performance in science between students in the top vs. bottom quartile of ambitious learning goals, value of school, sense of belonging
Table 2.5	Score-point difference in performance in mathematics between students in the top vs. bottom quartile of enjoyment of reading, motivation to master tasks and self-efficacy
Table 2.6	Score-point difference in performance in mathematics between students in the top vs. bottom quartile of ambitious learning goals, value of school, sense of belonging
Students' educational and career expectations	
Table 2.7	Percentage of 15-year-old students who expect to complete tertiary education, by indicators of SES (parental education, parental occupation, household possessions)
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Table 2.11	Percentage of 15-year-old students who expect to be employed within a low-skilled occupation, by indicators of SES (parental education, parental occupation, household possessions)
Table 2.12	Percentage of students expecting to complete tertiary education by quartiles of enjoyment of reading
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Table 2.18	Odds-ratios of expecting to complete tertiary education for students in the top relative to the bottom quartiles of enjoyment of reading
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Table number	Table Title
Teacher support	
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Table 2.36	Change in parents' academic home involvement associated with each obstacle
Table 2.37	Change in parents' non-academic home involvement associated with each obstacle
Table 2.38	Change in parents' school involvement associated with each obstacle
Table 2.39	Percentage difference in key indices of parental involvement and emotional support between students attending schools that score in the top vs. low quartiles of the index of school policies for parental involvement

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Notes

¹ Number of learners enrolled at pre-primary, primary, lower-secondary and upper-secondary levels of education (ISCED levels 0 to 3), as well as at tertiary education levels (ISCED levels 5 to 8).

² Similar patterns are observed for the other LLLAs.

³ Disciplinary climate is an indicator constructed from students' answers to the PISA questionnaire that measures the degree to which noise and disorder are kept to a minimum, and students listen to teachers during classes.

⁴ On average across OECD countries, a one-unit increase in the index of teacher enthusiasm is associated with a 0.09-point increase in the indices of both students' motivation to master tasks and ambitious learning goals. Indices are standardised, so that one unit of an index corresponds to one standard deviation.

⁵ Country-specific estimates are presented in the supplementary online tables to Chapter 2. See Annex Table 2.A.1.

⁶ Students' answers are then mapped into dummy variables, taking value 1 when students agree with the statements or 0 otherwise.

⁷ The item related to whether students agree or strongly agree that the "enthusiasm of the teacher inspired me".

⁸ The other items do not seem to yield positive or statistically significant associations with the attitudes in most OECD countries, despite a few exceptions.

⁹ The PISA survey interviews school principals, collecting information on their perception of whether the school's capacity to provide instruction was hindered by the following issues: "a lack of teaching staff, "inadequate or poorly qualified teaching staff", "a lack of assisting staff" and "inadequate or poorly qualified assisting staff". It then combines answers to create the index of shortage of education staff, whose average is 0 and whose standard deviation is 1 across OECD countries. Positive values reflect principals' concern that a shortage of education staff hinders the capacity to provide instruction more than the OECD average.

¹⁰ To disentangle the specific association between parental support and LLLAs, estimates consider students' SES, age, gender and cognitive abilities, as well as the school's socio-economic background and all the TPs described in the previous section.

¹¹ This corresponds to one-quarter of a standard deviation. All the indices of LLLAs and parental emotional support are standardised, so that one unit of an index corresponds to one standard deviation.

¹² Nine OECD countries distributed the parent questionnaire: Belgium, Chile, Germany, Ireland, Italy, Korea, Luxembourg, Mexico and Portugal.

3

Lifelong learning trajectories: The transition from compulsory schooling to young adulthood

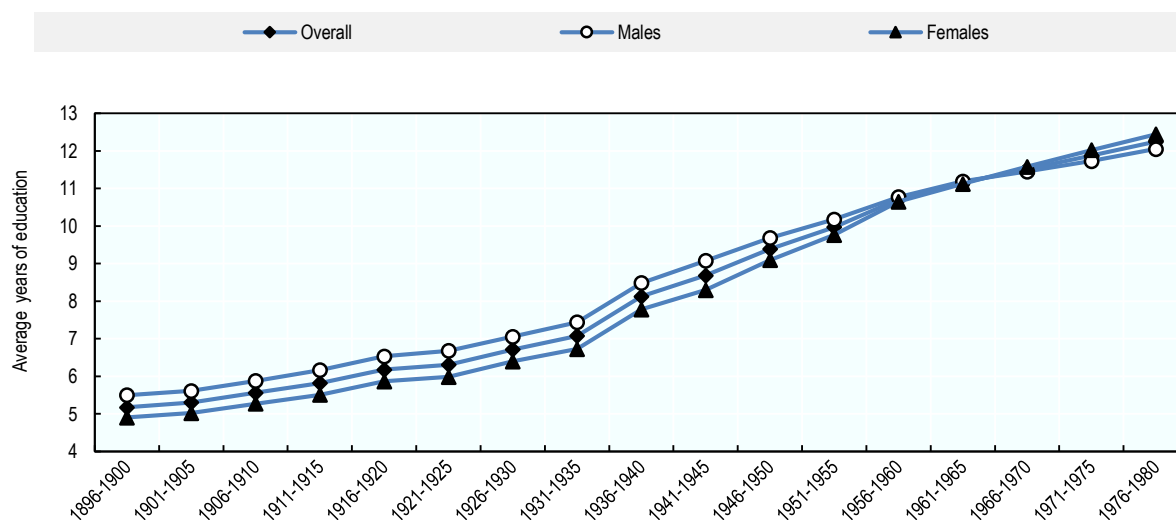
This chapter examines the accumulation of information-processing skills over the life course, with a particular emphasis on the transition between the end of compulsory schooling and young adulthood. It highlights differences across countries in literacy achievement between age 15 and ages 26-28 among the overall population, and among high and low achievers. It illustrates differences in achievement growth across youngsters from families with tertiary-educated parents and those coming from families with parents who achieved at most an upper-secondary degree. It considers the factors associated with the acquisition of skills at a young age, with a particular emphasis on learning opportunities that occur in employment, education and training. The chapter concludes by examining secondary students' attitudes and expectations for their future, as well as the opportunities allowing them to make informed educational and career choices.

Introduction

The framework developed in Chapter 1 suggests it is crucial for governments to ensure that individuals reach a high level of foundation skills by early adulthood. Individuals must invest in lifelong learning to maintain high levels of foundation skills, acquire complementary technical skills, along with job-specific knowledge and expertise that will help them adapt to technological and social transformations. In the past, education systems relied on compulsory schooling to enable all individuals to reach an adequate level of foundation skills to meet the needs of the labour market, with only few individuals progressing to post-secondary education. Individuals who pursued tertiary qualifications were typically those who entered professions (such as medicine, teaching and law) requiring specialised knowledge and skills immediately upon entry, or sought to enhance their social status.


Figure 3.1 shows long-term trends in the average years of schooling attended by cohorts of individuals over the 20th century, as along with the percentage of the adult population from the same birth cohorts in OECD countries who completed a tertiary degree. The results depict a marked increase in investments in initial education and training, especially for individuals who would have been around 15 in the 1950s. Following the Second World War, geopolitical, technological and social transformations led many countries that are now part of the OECD to invest in developing a skilled population while contributing to reconstruction. The trend continued well into the second half of the 20th century and the early 21st century.

Figure 3.1. OECD average long-term trends in years of education completed, overall population and by gender



Note: The figure shows the OECD-average of completed years of education. The values are simple averages over countries without weighting by population.

Source: Adapted from Barro and Lee (2013^[1]), "A new data set of educational attainment in the world, 1950-2010," <http://dx.doi.org/10.1016/j.jdevco.2012.10.001>.

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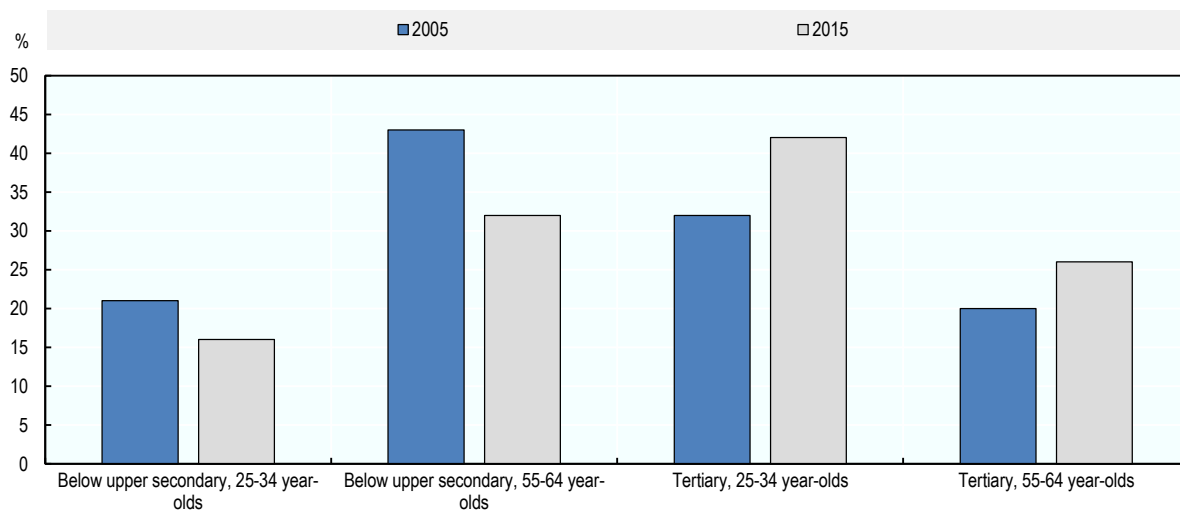
The learning opportunities available to individuals after compulsory schooling can determine their economic, social and labour-market outcomes. In the not so recent past, 15 was close to the age at which young people – even those who had decided to continue their education beyond the compulsory minimum

– completed their studies. Over the last 30 years, however, OECD countries have experienced a major expansion in educational participation and attainment: people have been spending more time in education and training, delaying their entry into the full-time labour market. In many countries today, a 15-year-old student can expect to remain in education for another 5-10 years.

Figure 3.2 presents data on trends in educational attainment between 2005 and 2015 for the birth cohorts aged 25-34 and 55-64 in the two reference years. In 2005, as many as 21% of 25-34 year-olds had not completed upper-secondary education; by 2015 this percentage had dropped to 16%. In the older cohort, 43% of 55-64 year-olds had not completed an upper-secondary degree by 2005; however, this percentage had dropped to 32% by 2015. Over the same period, an increasing proportion of individuals participated in tertiary education: in 2005, only 20% of 55-64 year-olds had obtained a tertiary degree, compared to 26% by 2015. Among the younger cohorts, 32% of 25-34 year-olds had obtained a tertiary degree in 2005, a percentage that had risen to 42% by 2015.

Figure 3.2. Trends in educational attainment between 2005 and 2015 in OECD countries, by age group

Percentage of adults, by age group



Note: Each bar represents the share of individuals within the given age group who completed the given qualification. The figure compares 2005 and 2015.

Source: OECD (2016^[2]), *Education at a Glance 2016: OECD Indicators*, <https://dx.doi.org/10.1787/eag-2016-en>.

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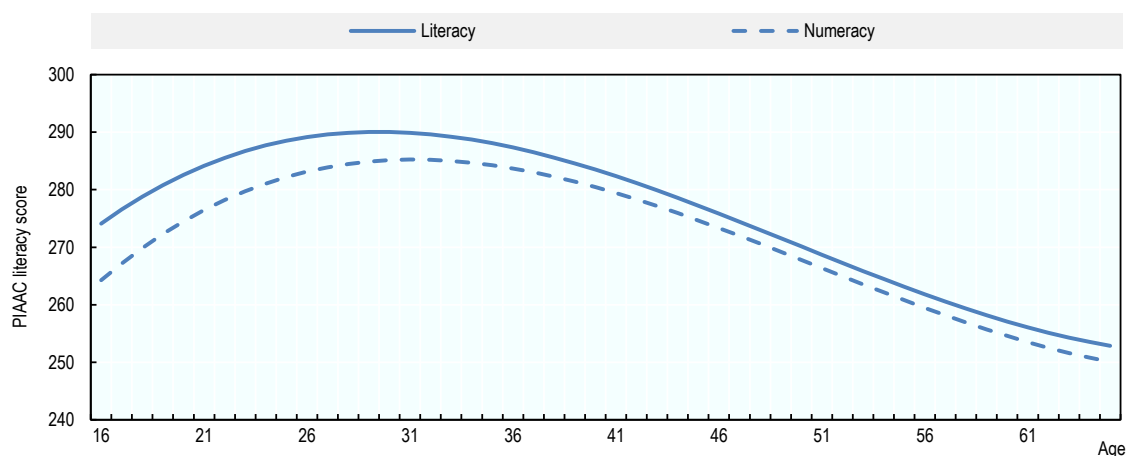
Broad socio-economic and technological transformations are resulting in longer working lives, a greater need for skilled workers and changing skill requirements. These new circumstances are producing new policy objectives, including 1) ensuring that children reach the end of compulsory school with high levels of foundation skills and attitudes associated with a lifetime interest and ability to acquire new skills and knowledge, and 2) ensuring that school leavers make the most of post-compulsory learning opportunities.

Such investments are important if individuals are to keep improving their foundation skills into young adulthood and beyond. Evidence from the Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC indicates that literacy levels only peak around the age of 30 (Figure 3.3)). This evidence is based on cross-sectional data, thus confounding ageing effects with period and cohort effects. However, because of changes in levels of educational attainment,

older individuals captured in cross-sectional studies differ from younger cohorts, not only because of age, but also because of broad changes in levels of educational attainment, work patterns, etc.

Longitudinal studies have confirmed cross-sectional data on skill depreciation. Recent longitudinal evidence on how skills change over adults' lives as a function of ageing and experience was developed using data on individual performance in professional chess tournaments over the past 125 years (Strittmatter, Sunde and Zegners, 2020^[3]). This evidence allowed mapping changes in individuals' abilities as they grew older, using an objective measure of cognitive skills – their proficiency in chess. Results validate the hump-shape distribution illustrated in Figure 3.3 (Strittmatter, Sunde and Zegners, 2020^[3]). The evidence further indicates a long-run shift: other things being equal, individuals from younger cohorts display higher proficiency than individuals from older cohorts did at the same age. This shift could be explained by the better education enjoyed by younger cohorts.

Figure 3.3. Age-proficiency profiles in literacy and numeracy in the Survey of Adult Skills (PIAAC), OECD average



Note: The figure illustrates the relationship between age and literacy and numeracy.

Source: Paccagnella, M. (2016^[4]), "Age, ageing and skills: Results from the Survey of Adult Skills", <https://dx.doi.org/10.1787/5im0q1n38lvc-en>.

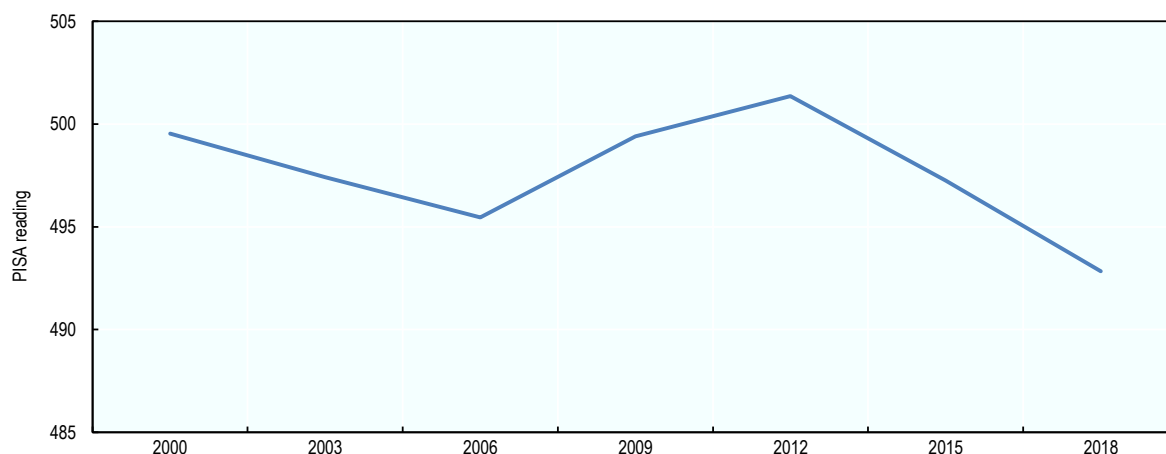
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Skills, attitudes and dispositions are developed over the life course. They are also transmitted across generations, extending the reach and relevance of investments in education and training beyond the life of any single individual. Crucially, the effectiveness of individuals' learning investments, and the ease with which they are able to maintain, upgrade or acquire new skills, depend on their experience with prior learning. In the early years, such experience largely rests on the skills and education of the previous generation, leading to the intergenerational transmission of educational advantage. Children from households with high levels of skills and human capital are generally more likely to accumulate skills that will enable them to flourish. However, the degree to which family determines skill development and lifelong learning opportunities varies in different contexts and education systems. At later stages, prior learning becomes progressively more important in shaping an individual's learning trajectory.

Evidence from the Programme for International Student Assessment (PISA), conducted every three years in a growing number of education systems worldwide, allows mapping how the literacy skills of individuals leaving compulsory schooling have changed between 2000 and 2018. The results reveal a worrying trend: mean literacy achievement over 2000-18 decreased by around 7 score points on the PISA scale, entirely owing to a steep decline in the mean literacy achievement of the lowest-achieving students. Figure 3.4 illustrates the evolution in literacy achievement over successive PISA cycles in the 23 OECD countries

that participated in all seven editions of the study. Figure 3.5 shows that the change in PISA scores between 2000 and 2018 primarily stemmed from a decline at the bottom tail of the literacy achievement distribution.

Figure 3.4. Trends in mean literacy achievement in PISA, OECD average



Note: The figure shows the OECD average of PISA reading score for successive cohorts of 15-year-old students tested between 2000 and 2018.

Source: OECD (2019^[5]), *PISA 2018 Results (Volume I): What Students Know and Can Do*, <https://dx.doi.org/10.1787/5f07c754-en>.


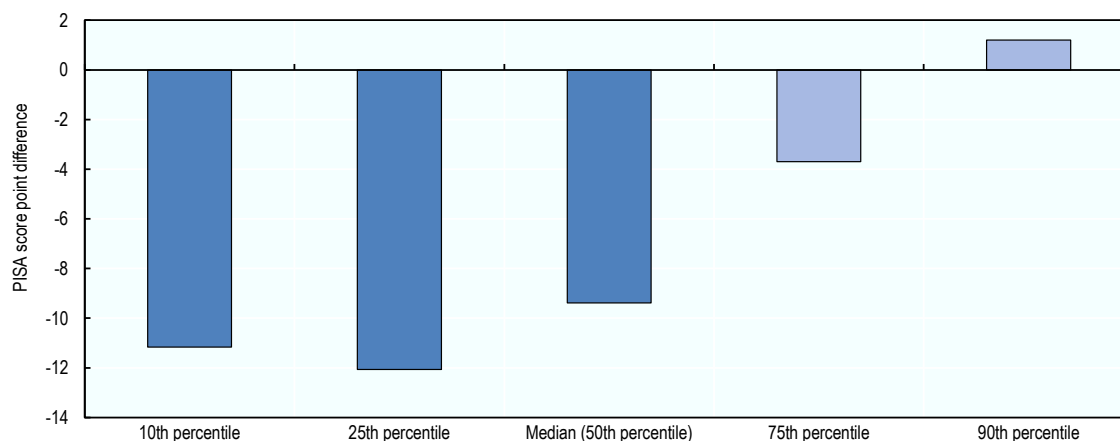
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Figure 3.5. Change in literacy achievement among 15-year-old students between 2000 and 2018, OECD average, by percentile of achievement



Note: Results indicate the change (2000-18) in the literacy achievement of students at each percentile depicted. Results represent average values for the 23 countries with available data in all cycles between 2000 and 2018. A darker colour denotes a difference between 2000 and 2018 that is statistically significant at the 5% level.

Source: OECD (2019^[5]), *PISA 2018 Results (Volume I): What Students Know and Can Do*, <https://dx.doi.org/10.1787/5f07c754-en>.

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This chapter considers how countries can ensure that individuals reach a high initial level of foundation skills, to ensure that the transition between adolescence and young adulthood from compulsory schooling to further education and training is marked by growth in achievement. It considers systems that effectively promote achievement growth, and countries in which achievement growth in young adulthood favours socio-economically advantaged or disadvantaged youth. The chapter then presents evidence on factors – such as engagement in education, training or the labour market – associated with smoother transitions, mapping which countries offer youngsters orientation and guidance.

Lifelong learning and transitions

Certain life stages play an important role in shaping individuals' potential learning pathways, both in terms of depth and breadth of learning. To some extent, such stages are biologically determined and reflect maturation processes induced by brain plasticity and general cognitive functions, as well as emotional and affective reactions to environmental stimuli. However, education and training policies, labour-market policies, and social and welfare policies can facilitate (or hinder) the influence of particular life stages on learning pathways, determining the extent to which different individuals are able to acquire new skills and develop new attitudes and dispositions throughout their lives.

Early childhood is an important phase, during which individuals can build strong foundations and develop cognitive functions, as well as the socio-emotional and motivational skills needed to engage in lifelong learning (see Chapter 2). A growing body of evidence details those interventions that can best promote skill development among young children, underpinning their inclination to become lifelong learners. However, cross-country comparable data at young ages remain scarce. The OECD aims to remedy this gap by contributing solid frameworks to acquire and analyse such data (OECD, 2020^[6]; OECD, 2017^[7]).

Formal education stimulates skill development, building on individuals' readiness to learn early in life and preparing them to participate in the labour market and society. In the schooling years, formal classroom learning is the primary form of learning, although informal and non-formal learning accompany formal learning processes. Knowledge and skills grow rapidly during the schooling years, and the compulsory nature of participation in schooling can stem the evolution of socio-economic differentials in achievement. Empirical evidence from countries performing detailed monitoring of education systems, including individual-level longitudinal follow-ups, suggests that in many contexts disparities are well-established before schooling starts and do not grow – or grow only moderately – during the school years (Duncan and Magnuson, 2013^[8]; Skopek and Passaretta, 2020^[9]).

As important as the early years are, the teenage years and early adulthood mark a second period of rapid and profound evolutions. These include both biological transformations and changes in individuals' agency over their learning trajectories. Schooling ceases to be compulsory, and individuals and their families are able to make a growing number of choices concerning their learning pathways. Such decisions involve the overall quantity and content of learning, and whether it occurs in formal, informal or non-formal settings. The intended learning trajectories also rely increasingly on people – including trainers in vocational education and training (VET) institutions and supervisors or colleagues in work settings, when learning takes place informally – who are less subject to monitoring than school teachers, and for whom training others is only a part-time occupation.

While biological changes are universal, agency acquisition differs greatly depending on individual countries' social and institutional features. These features often interact with individuals' educational, social, economic and cultural capital derived from their family background. From the teenage years onwards, opportunities for skill development become highly differentiated. Some individuals participate in formal learning through adult education and training, while others rely more on formal and informal learning opportunities in the labour market and everyday life. The manner in which differentiation shapes

individuals' lifelong learning trajectories can vary markedly across countries, and across groups of individuals within each country.

Mapping what occurs across countries and socio-economic groups during the transition from the teenage years to young adulthood is, therefore, crucial. This stage represents the last opportunity for countries to promote foundation skills on a large scale, remedying any failures that occurred during the school years. Countries can also ensure that individuals transition into a period characterised by cognitive decline from higher initial levels of foundation skills acquired in young adulthood. Although individuals can develop information-processing skills beyond young adulthood, successful skill development in adulthood and old age requires considerable investment and effort.

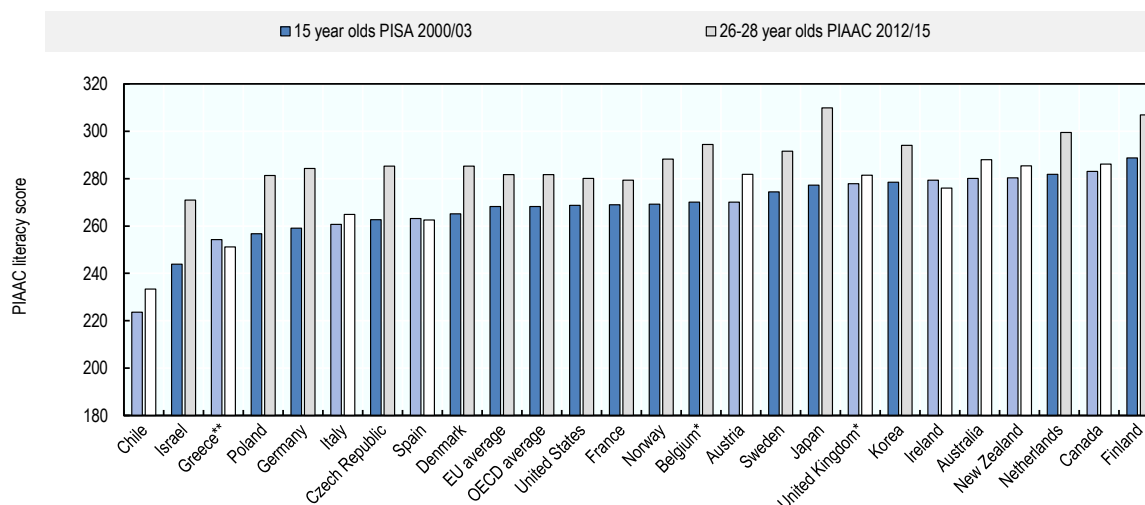
This chapter presents evidence on differences in overall patterns of achievement growth between the end of compulsory schooling and young adulthood, both overall and across different groups of individuals who can rely on different levels of cultural and educational capital. It explores the factors that may explain differences in achievement growth across countries and population groups within countries. Prominent factors are the support individuals receive during the transition, and their eventual participation in formal, informal and non-formal learning opportunities.

Country differences in achievement growth between ages 15 and 27

Figure 3.6 illustrates the evolution in literacy proficiency among 15-year-olds tested in PISA in 2000 and the same birth cohort tested in the Survey of Adult Skills (PIAAC) in 2012 at around age 27 (the results presented refer to 26-28 year-olds, but the tables available on line present estimates for age 27 among a wider band of 25-29 year-olds), as well as the evolution in numeracy proficiency. The results indicate that across OECD countries with available data, individuals' literacy achievement between the ages of 15 and 27 grew on average from 268 for 15-year-olds to 282 for 27-year-olds – an increase of 14 points on the PIAAC literacy scale, or around 30% of a standard deviation. However, Figure 3.6 also identifies a large heterogeneity in achievement growth across the 24 countries examined.

Some of the countries with the lowest levels of literacy achievement among 15-year-olds in 2000 experienced no statistically significant changes in mean literacy achievement. In Greece and Spain, estimated growth in achievement was close to zero (although imprecisely estimated). Yet achievement growth was also low (and not statistically different from zero) in Australia and Canada – two of the countries with the highest levels of mean literacy achievement among 15-year-olds in 2000. Similarly, some of the countries with the largest improvements, such as Israel, Germany and Poland, showed below-average mean achievement in 2000. Japan had the most marked growth in achievement, corresponding to 31 points on the PIAAC scale, or around 65% of a standard deviation – an improvement on the already high levels of achievement recorded at age 15. Other sections in this chapter examine the extent to which these general patterns apply to specific population groups. They also observe which factors explain the observed differences across countries and could be leveraged to promote achievement growth between adolescence and young adulthood.

Figure 3.6. Achievement growth in literacy between ages 15 and 27, by country



Note: Countries are sorted in ascending level of achievement among 15-year-olds. Differences between age 15 and ages 26-28 that are not statistically significant at the 5% level are marked in a lighter tone. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017^[10]) and based on the methods described in Box 3.1. Robustness checks and results for numeracy are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. In PISA 2000, the United Kingdom and the Netherlands fell short of the minimum response rate requirements. Information provided by the United Kingdom led to the assessment that response bias was likely negligible. No similar information was provided by the Netherlands. PISA data for Chile and Greece refer to 2003. PIAAC data for Chile, Greece, Israel, New Zealand refer to 2015. How concordance scores between PISA and PIAAC were derived is described in Box 3.1.

* In PIAAC, data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland jointly. The relevant estimated PIAAC score for Flemish community of Belgium in PISA 2000 is 282 and the PIAAC score difference between 15 and 27-year-olds corresponds to 12 points.

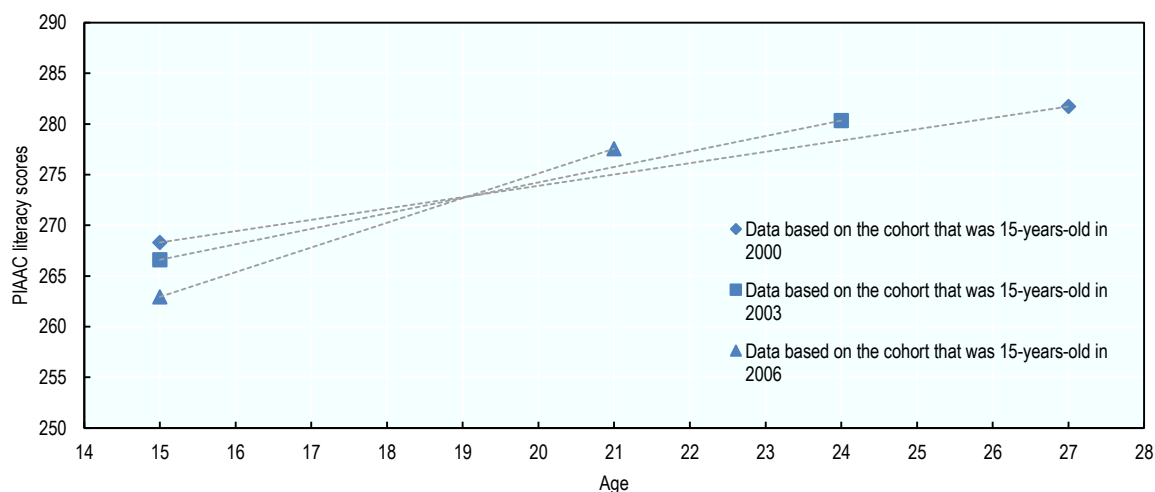
**The data for Greece include a large number of cases (1 032) in which there are responses to the background questionnaire but where responses to the assessment are missing. Proficiency scores have been estimated for these respondents based on their responses to the background questionnaire and the population model used to estimate plausible values for responses missing by design derived from the remaining 3 893 cases.

Source: OECD (2000^[11]), *PISA database 2000*; <https://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2003^[12]), *PISA database 2003*; <https://www.oecd.org/pisa/data/database-pisa2003.htm>; OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Figure 3.7 presents the mean literacy achievement of successive cohorts surveyed in PISA in 2000, 2003 and 2006 at age 15, and their respective level of literacy achievement at ages 21, 24 and 27. The results show that on average across OECD countries with available data, the literacy achievement of 15-year-olds declined (by 5 score points or around 10% of a standard deviation) between 2000 and 2006. Moreover, the estimated achievement growth at age 21 for the PISA cohort surveyed in 2006 was similar to the estimated achievement growth for the PISA 2000 cohort at age 27, corresponding to 15 score points. These results suggest that most of the growth in achievement between the ages of 15 and 27 occurs in the years immediately following the end of compulsory schooling.

Figure 3.7. A comparison of achievement growth among cohorts of 15-year-olds in 2000, 2003 and 2006, OECD average



Note: The three lines illustrate mean literacy achievement on the PIAAC literacy scale of successive birth cohorts captured for the first time at age 15 in the PISA study. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017^[10]) and based on the methods described in Box 3.1. The supplementary online tables for Chapter 3 present the full results. See Annex Table 3.A.1.

Source: OECD (2000^[11]), *PISA database 2000*, <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2003^[12]), *PISA database 2003*, <http://www.oecd.org/pisa/data/database-pisa2003.htm>; OECD (2006^[15]), *PISA database 2006*, <http://www.oecd.org/pisa/data/database-pisa2006.htm>; OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Box 3.1. Technical note on linking achievement in PISA and PIAAC

Few countries implemented longitudinal follow-ups of PISA participants that include the administration of skills assessments. Canada and Denmark are important exceptions in this respect: in Canada a sample of students participating in the 2000 PISA study was tested again in 2009 using PISA instruments and in Denmark a sample of students participating in the 2000 PISA study was part of the PIAAC study in 2012. Hence, the results presented in this section build on two sources of data: PISA and the Survey of Adult Skills (PIAAC). To examine literacy and numeracy achievement growth between age 15 and young adulthood, analyses are conducted on synthetic cohorts, matching data from PISA and the relevant birth cohort captured in the Survey of Adult Skills (PIAAC). Sample sizes used to construct the synthetic cohorts vary markedly: in PISA, the cohort comprises around 4 500 students per country, compared to only around 150 individuals in the Survey of Adult Skills (PIAAC). For this reason, the PIAAC age band was expanded to include people born one year before and after the relevant PISA cohort. For example, PISA 2000 results are matched to data for 26-28 year-olds surveyed in the Survey of Adult Skills (PIAAC) in 2012 – which, unlike PISA, has been conducted only once so far – for the 17 countries that participated in both. To increase international coverage, data from PISA 2003 were added for three countries that administered the Survey of Adult Skills (PIAAC) in 2015. Similarly, data for PISA 2003 are matched to data for 23-25 year-olds in the Survey of Adult Skills (PIAAC). The supplementary online tables for Chapter 3 present a summary of country-specific sample sizes (see Annex Table 3.A.1).

To identify how achievement growth differs across the two groups, the analyses use evidence on scale concordance provided in Borgonovi et al (2017^[10]). No attempts were made to link the Survey of Adult Skills (PIAAC) and PISA at the international level during the design of the two studies. However, in PISA 2012, countries had the opportunity to extend the PISA target population through national options. Scale concordance was estimated using data from Poland, which in 2012 complemented the international PISA sample with a grade-based sample covering a broader age range. As a result, the Polish PISA grade extension included individuals who could have been part of the PIAAC sample. (Borgonovi et al., 2017^[10]) used a pseudo-equivalent group approach to achieve pseudo-equivalency between PISA and PIAAC, using propensity score reweighting techniques. All estimates are presented on the PIAAC scale.

This chapter presents estimated differences among high-achieving individuals (90th percentile of the relevant proficiency distribution) and low-achieving individuals (10th percentile of the relevant proficiency distribution), both across the relevant population and across groups defined in terms of parental educational attainment. Box 3.2 and Box 3.3 illustrate findings from longitudinal studies at the individual level on factors that promote successful transitions between age 15 and young adulthood.

Source: Borgonovi et al. (2017^[10]), “Youth in transition: How do some of the cohorts participating in PISA fare in PIAAC?”, *OECD Education Working Papers*, No? 155, <https://dx.doi.org/10.1787/51479ec2-en>.

Socio-economic disparities in achievement growth between ages 15 and 27

Figure 3.6 illustrates the patterns in average literacy achievement growth between the ages of 15 and 27. While such growth differed across countries, it could also vary across individuals who come from households with different levels of educational and cultural capital. Such variations could stem, for example, from differences in learning opportunities afforded to various socio-economic groups during the transition from compulsory schooling to further education, training, or the labour market.

Several studies have explored the evolution of disparities in achievement between age 15 and young adulthood in different countries (Borgonovi et al., 2017^[10]; Dämmrich and Triventi, 2018^[16]), but the lack of psychometric linkages has prevented the study of disparities in achievement growth. This is an important shortcoming.

Differences in parental educational and cultural capital – which influence the informal learning opportunities available to children outside of formal education – could lead to disparities in achievement growth across economic groups. By shaping school selection and parental investment in schooling, they could also determine the formal learning that takes place in schools. Children whose parents hold more advanced formal educational qualifications, and invest in their own lifelong learning, typically achieve at a higher level in school than children whose parents have lower levels of educational attainment. If growth in achievement is positively correlated to previous achievement levels, as detailed in Chapter 1, then the achievement disparities among individuals whose parents have different levels of education are bound to grow cumulatively over time (DiPrete and Eirich, 2006^[17]). Access to post-secondary educational opportunities is especially conditional on success in secondary education and, unlike earlier levels of schooling, is not compulsory (Breen and Jonsson, 2005^[18]).

However, differences in prior learning are not the only factor that can shape learning trajectories among socio-economic groups. The teenage years and young adulthood in particular are a period of major neurological changes, leading to higher impulsiveness, difficulty in evaluating long-term benefits versus short-term costs and a tendency to engage in risky behaviours. All these changes occur at a time when individuals are taking important educational, training and labour-market decisions which require them to evaluate the costs and benefits of alternative courses of action. Individuals from families with high levels

of educational and cultural capital can generally count on their families to provide strong support, both in terms of resources and advice on how to navigate the increased differentiation of educational and training pathways (Hartung, Porfeli and Vondracek, 2005^[19]; Johnson and Leenders, 2001^[20]). By contrast, individuals whose parents or guardians have little educational or cultural capital cannot count on their families for advice on how to navigate this important transition.

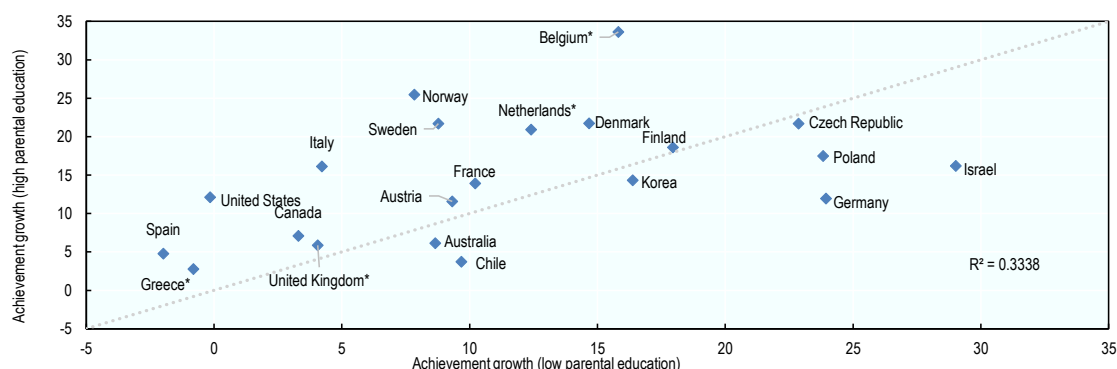
Avoiding downward social mobility is a key driver of the educational choices made by individuals and their families (Breen and Goldthorpe, 1997^[21]). Families with high educational and cultural capital are generally willing to invest considerable resources to this end, irrespective of their children's academic potential (Holm, Hjorth-Trolle and Jæger, 2019^[22]). Moreover, according to effectively and maximally maintained inequality theories (Holm, Hjorth-Trolle and Jæger, 2019^[22]; Raftery and Hout, 1993^[23]), even when there exist no quantitative limits on the number of individuals who can enrol in further education and training, there exist qualitative differences in opportunities. Families with high levels of educational and cultural capital seek to secure an educational advantage for their children by ensuring that they participate in more and better tertiary-level education, or engage in learning opportunities that maximise their learning potential.

Figure 3.8 illustrates for each country the level of growth in achievement between age 15 and age 27 among individuals whose parents did not obtain a tertiary degree and those with at least one tertiary-educated parent. On average across OECD countries, the gap in literacy between individuals with at least one tertiary-educated parent and individuals whose parents did not complete a tertiary degree grew by only a small amount, from 19 score points at age 15 (corresponding to 40% of a standard deviation) to 21 score points at age 27 (around 45% of a standard deviation). The evolution of disparities is similar when considering a different measure of socio-economic background and cultural capital, i.e. the number of books in people's homes: the difference in literacy achievement between individuals aged 15-16 with over 100 books at home and individuals with under 100 books at home stood at 27 score points for the cohort of students surveyed in 2000 at age 15, and at 30 score points for the same cohort when tested at age 27 (see the supplementary online tables for Chapter 3 in Annex Table 3.A.1).

Large differences exist in the evolution of disparities in literacy achievement across countries. In Belgium, Norway, Sweden, New Zealand, Italy and the United States, for example, the gap at the population level grew by more than 10 score points, corresponding to an increase of 20% of a standard deviation. Disparities grew because the growth in achievement was especially marked among individuals with tertiary-educated parents, whereas individuals whose parents had not obtained a tertiary degree showed little or no increase in achievement. In Germany and Israel, by contrast, disparities shrank by over 12 points, or 25% of a standard deviation.

At the country level, the size of the socio-economic gap in literacy at age 27 is positively associated with the size of the socio-economic gap in literacy at age 15, but the association is moderate in size (Pearson's $r=0.52$). The majority of countries are in the top triangle of Figure 3.8 meaning that achievement growth was more pronounced among individuals with high parental education than among individuals with low parental education. However, in a few countries, and especially in Israel and Germany, achievement growth was especially marked among individuals with low parental education.

Figure 3.8. Country-level association between disparities in achievement at age 15 and age 27 between individuals with parents with and without tertiary qualifications



Note: Achievement growth refers to the difference in literacy scores between age 27 (comprising 26-28 year-olds for sample-size purposes). The “low parental education” category comprises individuals who reported that neither of their parents had obtained tertiary-level qualifications; the “high parental education” category comprises individuals who reported that at least one of their parents had obtained tertiary-level qualifications. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al., (2017_[10]). Box 3.1 describes the methods used.

*For Belgium, Greece, the Netherlands and the United Kingdom, see notes under Figure 3.6.

Source: OECD (2000_[11]), *PISA database 2000*, <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2012_[13]; 2015_[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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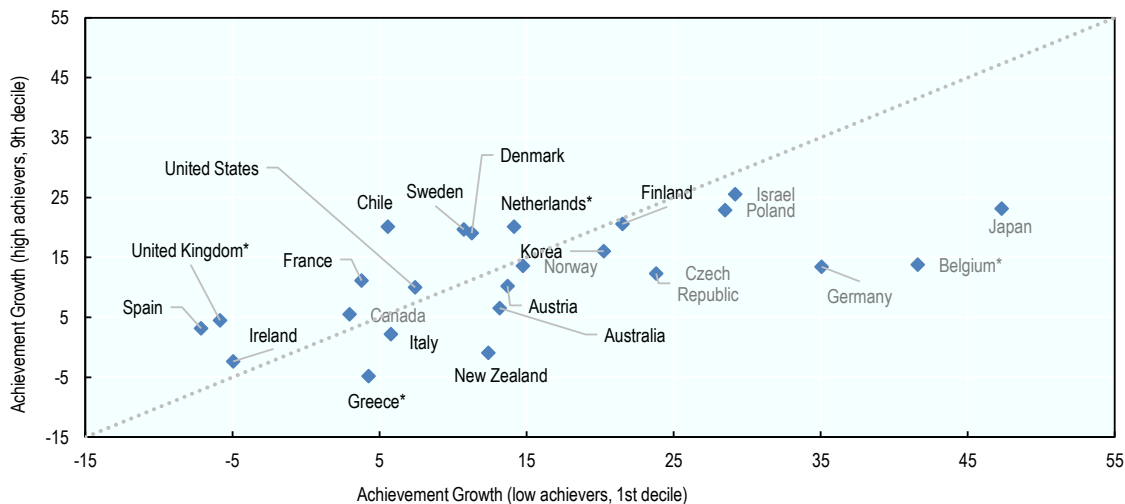
Differences in achievement growth across the performance distribution

Figure 3.6 reports the mean level of achievement on the PISA literacy scale of 15-year-olds tested in PISA in 2000 and individuals from the same birth cohort tested in the Survey of Adult Skills (PIAAC) in 2012 at age 27. The results indicate a literacy achievement score of 207 for the 10% lowest performing 15-year-olds, compared to a score of 222 for the 10% lowest performing 27-year-olds – this represents an increase of 15 score points, equivalent to around 33% of a standard deviation. By contrast, the literacy achievement score of the 10% highest-achieving 15-year-olds was 324, compared to a score of 336 for the 10% highest-achieving 27-year-olds – an increase of 12 points, equivalent to around 25% of a standard deviation. These results suggest that on average, the gap in performance between the highest and lowest achievers narrowed by around 6% of a standard deviation.

The small sample size of available data at the country level does not allow conclusively testing competing hypotheses for divergent findings of narrowing gaps by achievement levels and widening gaps by parental educational attainment. At the international level, however, these results seem driven by the fact that those whose achievement improves the most are low-achieving but high socio-economic status youngsters. Thus, parental investments appear to ensure that youngsters who do not learn at their full potential in formal schooling, and are therefore low achievers at age 15, are able to make the most of formal, informal and non-formal learning opportunities resulting from increased differentiation in learning pathways.

Just as Figure 3.6 illustrates large variability across countries in mean levels of achievement growth, Figure 3.9 identifies large variability across countries in the achievement growth of different groups, although performance disparities declined in most countries as a result of performance increases – especially among the lowest achievers. The marked increase in the performance of the top 10% achievers in countries like Finland, where it was already comparatively high at age 15, suggests that results are not driven by ceiling effects. Given the small sample size at the country level allowing comparisons at the 10th and 90th percentiles of achievement, country level results are generally imprecisely estimated.


Figure 3.9. Literacy achievement growth among low and high achievers between age 15 and age 27, by country



Note: Age 27 refers to 26-28 year-olds for sample-size purposes. High achievers are individuals in the top quarter of the national distribution of literacy achievement at a specific age. Low achievers are individuals in the bottom quarter of the national distribution of literacy achievement at a specific age. Countries are sorted in ascending order of achievement at age 15 among low-achieving individuals. PISA reading scores are expressed in PIAAC literacy scores, following Borgonovi et al. (2017^[10]). Box 3.1 describes the methods used. The supplementary online tables for Chapter 3 show the robustness checks and results for numeracy. See Annex Table 3.A.1.

*For Belgium, Greece, the Netherlands and the United Kingdom, see notes under Figure 3.6.

Source: OECD (2000^[11]), *PISA database 2000*, <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2003^[12]), *PISA database 2003*, <http://www.oecd.org/pisa/data/database-pisa2003.htm>; OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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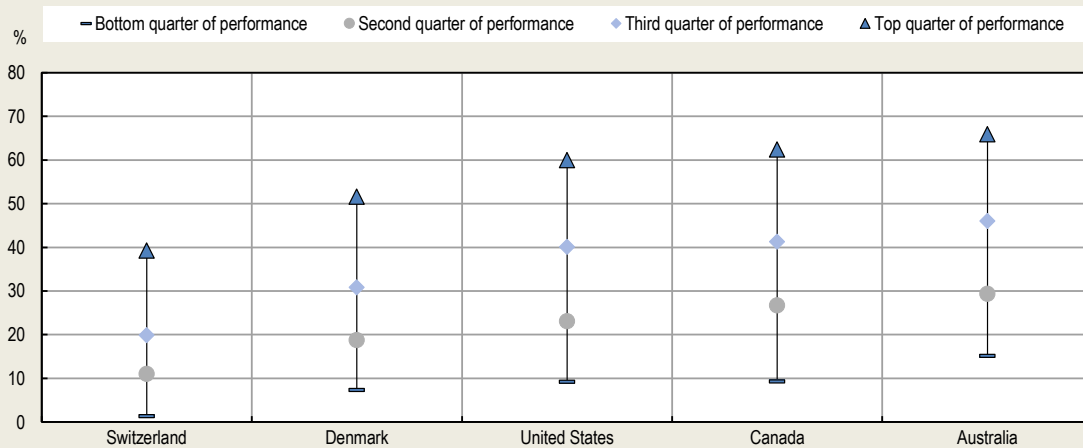
Box 3.2. School-to-work transitions: Evidence from longitudinal data of PISA students

Recent work by the OECD (2018^[24]) has used longitudinal data from five countries (Australia, Canada, Denmark, Switzerland and the United States) to examine the relationship between cognitive competencies at age 15, and educational attainment and early labour-market outcomes at age 25. The data sets from Australia, Canada, Denmark, Switzerland and the United States followed the transition into adulthood of early PISA cohorts (2000 and 2003). They have been exploited to shed light on the power of PISA literacy measures to predict adult life outcomes, such as university completion and labour-market prospects. An examination of the relationship between university completion and PISA performance reveals significant differences in achievement across quarters of reading performance in all countries (Figure 3.10).

In Switzerland, only 1% of students in the bottom quarter of reading performance, compared to 39% of students in the top quarter, complete university. In Canada, students in the top quarter of reading performance are 53 percentage points more likely than students in the bottom quarter to earn a university degree. In Australia, Denmark and the United States, differences between these two groups range from 44 to 51 percentage points. The relationship between 15-year-old students' reading performance and completion of a tertiary degree holds across different measures of performance and different fields of tertiary study.


When looking at early career outcomes – and particularly at the percentages of students in skilled employment (defined as a job requiring tertiary education) – by quarters of performance in PISA, the patterns that emerge are similar to the patterns of university completion. In Australia, only 14% of students who were in the bottom quarter of reading performance end up in skilled employment at the age of 25, while nearly 50% of students who were in the top quarter hold a skilled job at that age. In Denmark, students who were in the top quarter of performance at age 15 are 47 percentage points more likely than those in the bottom quarter to hold a skilled job at the age of 25. Differences for the other countries considered in this chapter range from 23 to 25 percentage points.

Figure 3.10. University completion among 25-year-old respondents, by quarter of PISA reading performance



Note: The difference between the top and the bottom quarters of reading performance is statistically significant in all countries. Quarters of performance are computed for the final sample of each country's longitudinal data set. Countries are ranked in ascending order of the percentage of students in the bottom quarter of reading performance.

Source: OECD (2000^[11]), *PISA database 2000*, <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2003^[12]), *PISA database 2003*, <http://www.oecd.org/pisa/data/database-pisa2003.htm>, Table 5.4; OECD (2018^[24]), *Equity in Education: Breaking Down Barriers to Social Mobility*, <https://dx.doi.org/10.1787/9789264073234-en>.

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Box 3.3. The Danish case: Evidence from a longitudinal study on PISA students

Denmark conducted the 2011-12 Survey of Adult Skills (PIAAC) among a sample of students who had participated in the PISA 2000 assessment. The Survey of Adult Skills (PIAAC) measures adults' proficiency in three key information-processing skills: literacy, numeracy and problem solving in technology-rich environments. Longitudinal follow-ups of PISA students reveal strong links between observable factors at age 15 – including cognitive proficiency and attitudes towards learning – and higher-education and labour-market outcomes.

The findings show that about 30% of the variation in Survey of Adult Skills (PIAAC) literacy and numeracy proficiency scores for 26-year-olds is explained by PISA performance scores in reading and mathematics among 15-year-olds. This indicates that the quality of previous educational opportunities influences how well young adults are equipped to participate in – and benefit from – increasingly knowledge-based societies. The findings also show that earlier education is only one of the factors shaping individuals' ability to process information as adults: attitudes towards schooling and learning developed in adolescence can also explain cognitive development beyond the age of compulsory education. Consistent with the findings detailed in Chapter 2, learning attitudes at age 15 are strong predictors of achievement in young adulthood: around 14% of the total variation in adults' proficiency in numeracy and 12% of the total variation in adult's proficiency in literacy is explained by learning attitudes reported at age 15. In fact, among the learning attitudes considered, students' self-efficacy, enjoyment of reading, and confidence in completing assignments and tests are the strongest predictors of numeracy and literacy proficiency at age 26.

Source: OECD (2018^[24]), *Equity in Education: Breaking Down Barriers to Social Mobility*, <https://dx.doi.org/10.1787/9789264073234-en>.

Smother transitions: Factors promoting growth in achievement

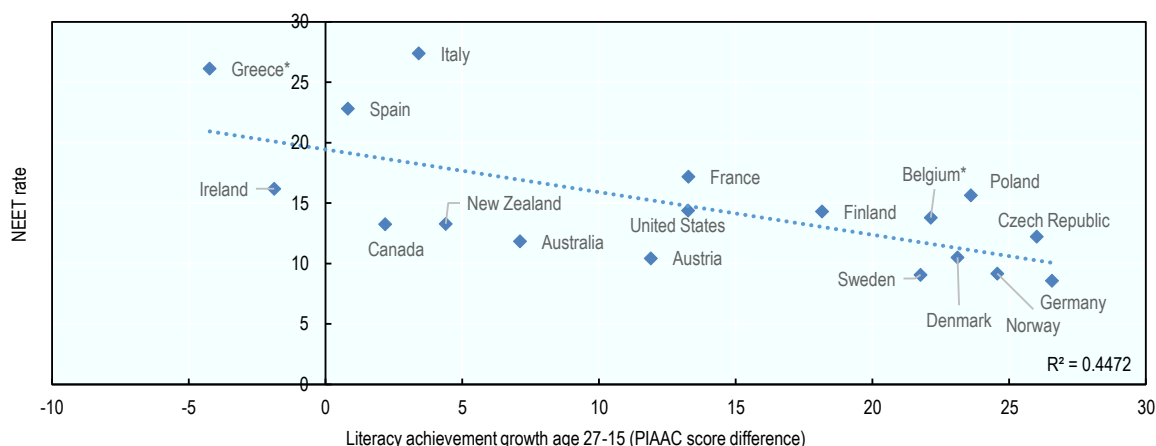
Formal, informal and non-formal learning opportunities

Disparities across countries and across different groups of achievement growth could stem from the opportunities for formal, informal and non-formal learning available to youngsters in each country and group. Such opportunities could arise from participation in post-secondary education or training, or from the use of specific skills in the workplace and everyday life. Individuals who have positive attitudes towards learning and are keen to develop their skills are also more likely to encounter learning opportunities.

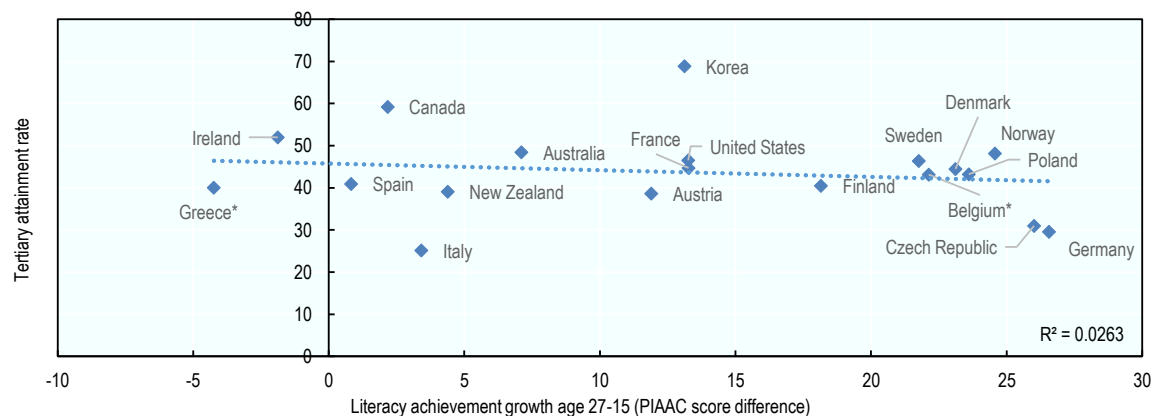
The overall prevalence of NEETs in a country is an important factor explaining the lack of skill development between the end of compulsory schooling and young adulthood, both at the country and individual level. Figure 3.11 shows a mid-size association at the country level between the prevalence of NEETs and average literacy achievement growth, and no association between tertiary attainment rates and literacy growth. In Germany, Sweden and Norway, less than 1 in 10 youngsters was NEET and achievement growth between age 15 and 27 was high. By contrast, in Greece and Italy more than 1 in 4 youngsters was NEET and achievement growth limited.

Figure 3.11. Country-level associations between literacy achievement growth, NEET rates and tertiary attainment rates

Panel A NEET rates




Panel B Tertiary attainment rates



Note: Panel A illustrates the country level association between achievement growth and the percentage of 15-29 year-olds who were not in employment, education or training (NEET) in 2015. Panel B illustrates the country level association between achievement growth and the percentage of 25-34 year-olds in 2015 who had completed a tertiary degree.

*For Belgium and Greece see notes under Figure 3.6.

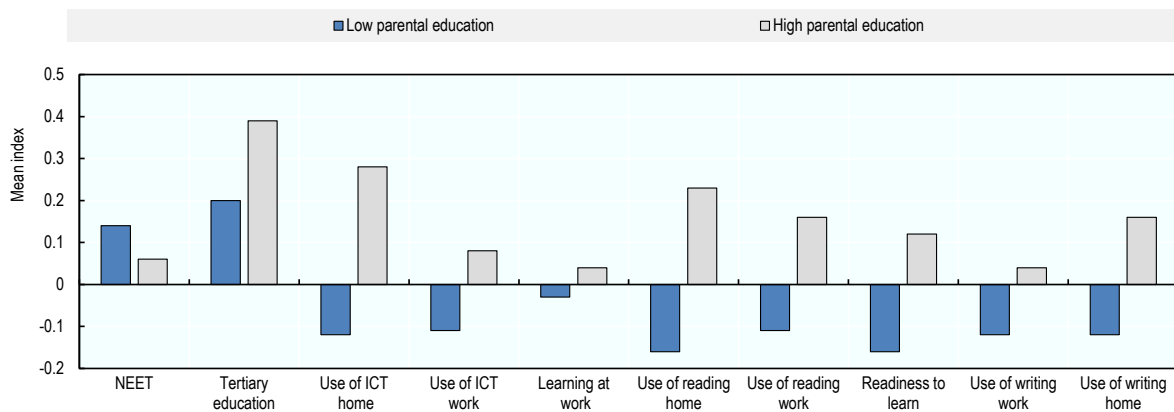
Source: OECD (2000^[11]), *PISA database 2000*, <http://www.oecd.org/pisa/data/database-pisa2000.htm>; OECD (2003^[12]), *PISA database 2003*, <http://www.oecd.org/pisa/data/database-pisa2003.htm>; OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>; OECD (2020^[25]), *Educational attainment and outcomes*, Education at a Glance, OECD.Stat, https://stats.oecd.org/Index.aspx?datasetcode=EDU_ENTR_FIELD.

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Not all youngsters have opportunities to develop their skills when they leave compulsory schooling. The results presented in Figure 3.12, which are based on 16-28 year-olds surveyed in the Survey of Adult Skills (PIAAC), indicate that individuals with tertiary-educated parents differ from individuals without tertiary-educated parents in key dimensions associated with growth in achievement. First, they are less likely to be classified as NEET. Second, they are more likely to have obtained a tertiary degree; to use reading, writing and information and communications technology (ICT) skills at home and in the workplace; and to engage in learning activities at work. Across OECD countries, for example, 14% of 16-28 year-olds without a tertiary-educated parent were NEET, compared to 6% of 16-28 year-olds with a tertiary-educated parent – a difference of 8 percentage points. By contrast, only 20% of 16-28 year-olds without a

tertiary-educated parent had obtained a tertiary degree, compared to 39% of 16-28 year-olds with a tertiary-educated parent. There also exist large differences in the use of skills at home and at work, and in self-reported readiness to learn and participation in learning activities at work. The differences amounted to 40% of a standard deviation for the use of ICT and reading skills at home.

Figure 3.12. Disparities by parental education in factors that are associated with skill development in young adulthood, OECD average



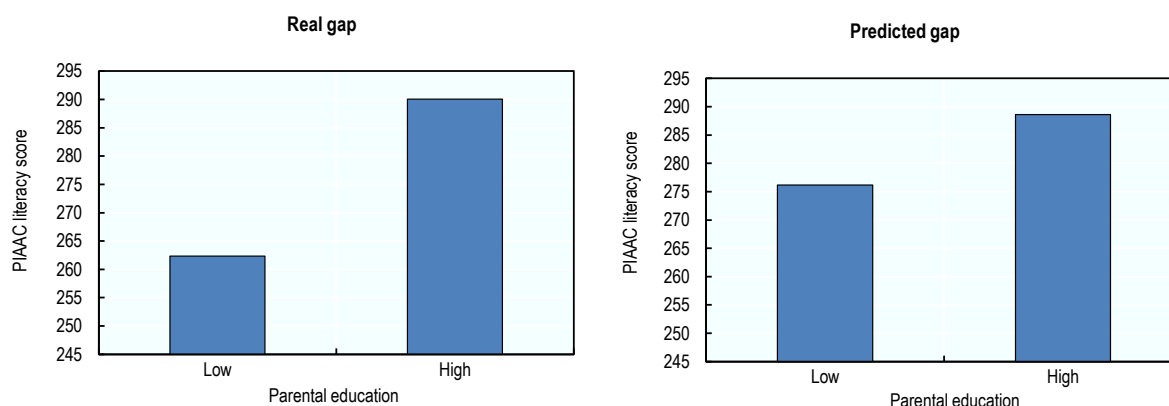
Note: 16-28 year-olds participating in the Survey of Adult Skills (PIAAC). All differences are statistically significant at the 5% level. NEET rates and rates of individuals engaged in tertiary education are expressed in proportion. All other indicators are expressed in indices standardised to have a mean of 0 across OECD countries and a standard deviation of 1.

Source: OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Figure 3.13 suggests that disparities in learning opportunities explain a large share of the differences in literacy achievement among 16-28 year-olds with at least one tertiary-educated parent and those whose parents did not obtain a tertiary qualification. On average across OECD countries, there exists a large difference (28 score points) in literacy achievement between 16-28 year-olds with and without tertiary-educated parents. However, the difference is considerably smaller (12 score points) when accounting for differences in opportunities for formal, informal and non-formal learning. The difference in achievement across the two groups before and after accounting for differences in learning opportunities is sizeable, corresponding to around 30% of a standard deviation in literacy achievement.

Figure 3.13. The role of learning opportunities in explaining disparities in literacy skills among young adults, OECD average



Note: The sample comprises 16-28 year-olds participating in the Survey of Adult Skills (PIAAC). Real gap estimates illustrate the difference in PIAAC literacy scores between individuals with at least one parent with a tertiary-level qualification (high parental education) and individuals with no parent holding a tertiary-level qualification observed in the sample. Predicted gap estimates illustrate the difference in PIAAC literacy scores between individuals with at least one parent with tertiary qualifications (high parental education) and individuals with no parent holding tertiary qualifications among individuals with similar NEET status; similar educational qualifications; similar use of reading, writing and ICT skills at home; and similar levels of readiness to learn. Estimates refer to a pooled linear probability regression model with country fixed effects.

Source: OECD (2012^[13]; 2015^[14]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

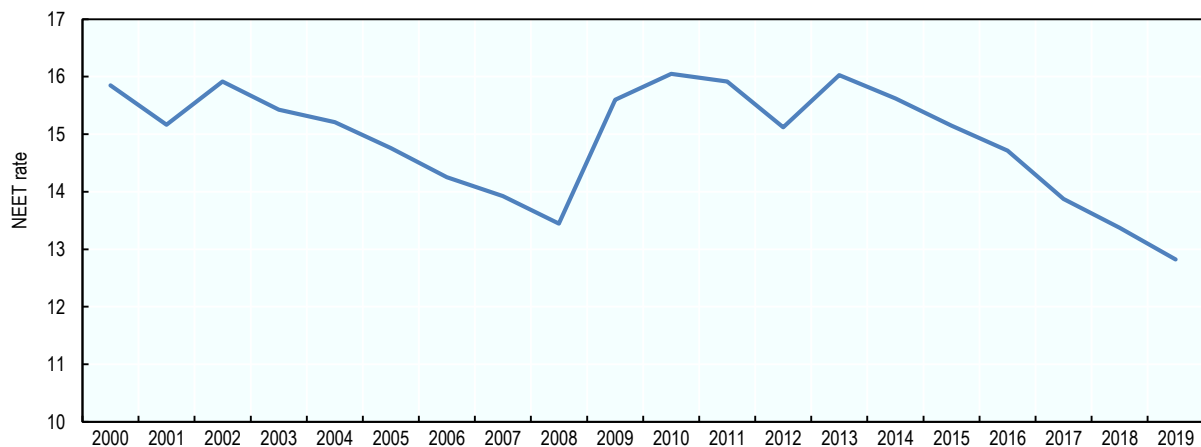
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Differences in the prevalence and distribution of learning opportunities explain not only within-country differences in achievement growth across different individuals but also – and crucially – different patterns of achievement growth and inequalities in achievement growth across countries. Countries that offer well-developed and widespread opportunities for skill development display reduced disparities in learning outcomes among youngsters. To facilitate inclusive learning during the transition from compulsory schooling into adulthood, countries should implement policies to minimise the share of NEETs and promote participation in post-secondary training opportunities. They should also create a cultural milieu where individuals routinely use their information-processing skills in the work and everyday activities.

Figure 3.14 suggests that between 2000 and 2019 between 12% and 16% of 15 to 29-year-olds were not in employment, education or training (NEET), thus being at an increased risk of failing to develop their skills through formal education or through learning on the job. The figure also highlights how the progress made in reducing the prevalence of NEETs achieved between 2000 and 2008 was undone by the financial crisis of 2008 and how the NEET rate took a decade to revert to pre-crisis levels. The figure hides important variations across countries: for example the NEET rate was lowest in 2008 in the Netherlands at 5% and highest in Turkey in 2005 at 44%. Although data on the evolution of the NEET rate in the OECD area in 2020 are not yet available, there is a high risk not only that data will reveal a marked increase in the number of youngsters who became NEET as a result of the pandemic, but also that these youngsters will struggle in the years to come as a result of the associated failure in consolidating and building their skills.

Figure 3.14. The evolution of the NEET rate between 2000 and 2019, OECD average

Percentage of 15-29 year-olds not in education, employment or training



Note: The figure illustrates the evolution between 2000 and 2018 in the percentage of 15-29 year-olds who were not in employment, education or training in the respective year.

Source: OECD (2020^[25]), *Educational attainment and outcomes*, Education at a Glance, OECD.Stat, https://stats.oecd.org/Index.aspx?datasetcode=EDU_ENTR_FIELD.

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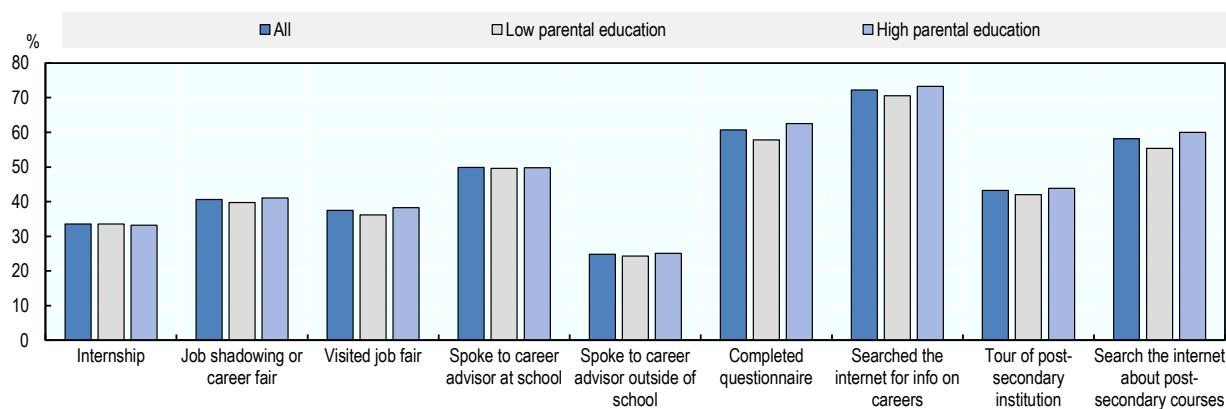
Educational and career orientation

Educational and career guidance and orientation programmes help youngsters develop knowledge and understanding of different occupations. They inform students on the skills and knowledge such occupations require upon entry, as well as the opportunities they offer in terms of career progression. Youngsters discover what working in such occupations entails in terms of financial rewards, opportunities for self-expression, time commitments, travel prospects and work-life balance. Such programmes complement any information youngsters may receive from their family members and immediate social circle, providing additional knowledge and experience that considers broader trends in education and the labour market. Access to high-quality guidance and orientation is increasingly important because of the differentiation in educational and career opportunities, especially within systems that offer little or no flexibility to youngsters who may embark on educational and career paths for which they are ill-suited.

Access to high-quality information on the opportunities to transition from compulsory schooling to further education and the labour market is highly variable, both across countries and across socio-economic groups within countries. Children from socio-economically advantaged households often have parents who possess the skills and knowledge to gather adequate information on alternative pathways and discuss the implications of different educational and career choices. They can also rely on the skills, experience and insights of their parents' social network, which can (formally or informally) help them navigate the transition. By contrast, socio-economically disadvantaged children can rarely rely on a strong support network to help them navigate the transition from compulsory schooling and further education and the labour market (Blustein et al., 2002^[26]; Bok, 2010^[27]; Smith, 2011^[28]). Guidance and orientation programmes are especially important to ensure the success of these youngsters and their families.


Although comparative data on the quality of orientation provided to children near the end of compulsory schooling are absent, 15-year-old students participating in the PISA study in 2018 were asked to describe the activities they pursued to explore future educational and career choices. Figure 3.15 shows few differences by socio-economic condition: children report low participation in face-to-face programmes that involve committing time and resources outside of normal day-to-day schooling, and higher participation in activities such as searching the internet for information on careers and educational opportunities. On average across the 19 OECD countries with available data, 34% of 15-year-old students reported having done an internship; 41% had participated in job shadowing or a worksite visit; 38% had attended a job fair; 50% had spoken to a career advisor at school, and 25% with a career advisor outside of school; 61% had completed a questionnaire to determine their interests and abilities; 72% had searched the internet for information about careers; 43% had gone on an organised tour of an International Standard Classification of Education (ISCED) 3-5 institution; and 58% had searched the internet for information about ISCED 3-5 programmes.

Figure 3.15. Activities undertaken by 15-year-old students to explore future educational and career choices, OECD average



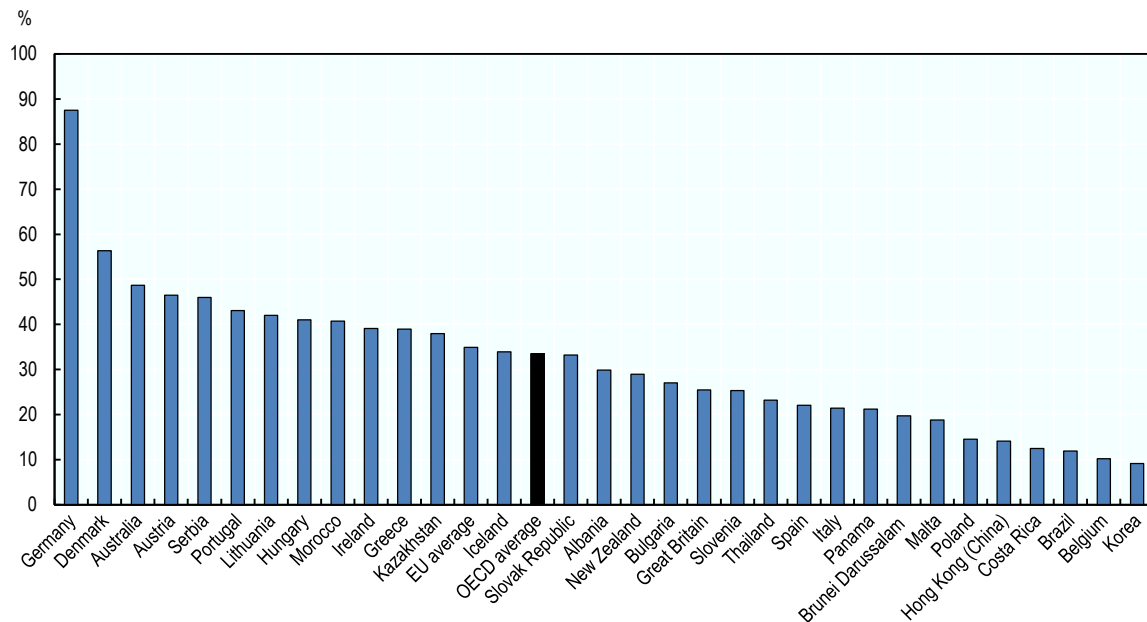
Note: Data represent OECD average results for countries that administered the optional Educational Career Questionnaire. Country-specific results are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. “All” refers to the overall student population. “Low parental education” refers to 15-year-old students who reported that neither parent had achieved a tertiary-level qualification. “High parental education” refers to 15-year-old students who reported that at least one parent had achieved a tertiary-level qualification.

Source: OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Although Figure 3.15 reveals few differences in the activities 15-year-old students with and without tertiary-educated parents undertake to gather information on educational and career prospects, Figure 3.16 reveals large differences across countries. For example, a full 87% of students in Germany reported participating in an internship, compared to only 9% of students in Korea.

Figure 3.16. Percentage of 15-year-old students who did an internship to explore future educational and career opportunities, by country



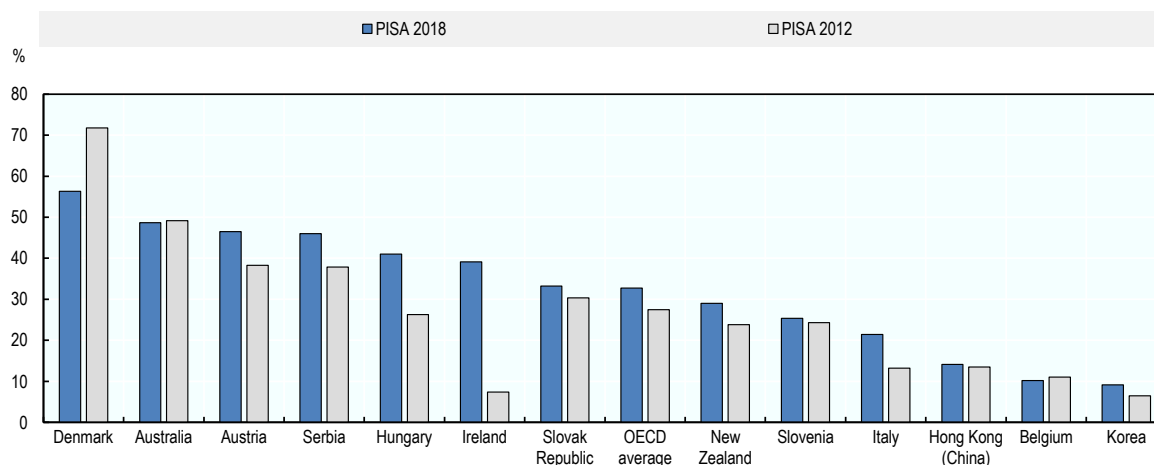
Note: Countries are ranked in descending order of the percentage of 15-year-old students who reported performing an internship to explore future educational and career opportunities in 2018. Data are available only for countries that administered the optional PISA Educational Career Questionnaire.

Source: OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Students seem especially interested in internships, which represent an opportunity to experience first-hand the demands of working life. Figure 3.17 indicates that participation in internships increased by 5% points on average between 2012 and 2018 in the 13 countries and economies that administered questions on participation in orientation programmes. In 2012, 27% of 15-year-old students reported having participated in an internship, compared to 33% by 2018. However, in Denmark – the country with the largest participation (72%) in 2012 – participation declined by 15 percentage points (56%) in 2018.

Figure 3.17. Percentage of 15-year-old students in 2012 and 2018 who performed an internship to explore future educational and career opportunities, by country



Note: Countries are sorted in descending order of the percentage of 15-year-old students who reported participating in an internship to explore future educational and career opportunities in 2018. Only countries with available data on both 2012 and 2018 are featured.

Source: OECD (2012^[30]), *PISA database 2012*, <http://www.oecd.org/pisa/data/pisa2012database-downloadabledata.htm>; OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Box 3.4. The role of internships

The workplace is a powerful learning environment where students can acquire technical skills from expert practitioners using real-life equipment, as well as key soft skills like teamwork and communication. School-mediated workplace learning offers students the opportunity to transition from school to work and provides employers with a means of recruitment. Student employment eases the transition into employment (Musset, 2019^[31]): data from Eurostat identify a strong link between student participation in work-based learning and employment outcomes up to the age of 34. Student participation in both mandatory and optional upper-secondary and post-secondary (non-tertiary) placements is associated with greater likelihood of adult employment. Evidence of more positive outcomes was found regardless of whether the associated programme of full-time study covered vocational or general education. Empirical research also identifies a positive association between teenagers' participation in part-time employment and their readiness to join the adult labour market (Patton and Smith, 2010^[32]). Part-time work is believed to encourage reflection and increase thoughtfulness in career planning and exploration (Creed and Patton, 2003^[33]). Several studies identify an important scope for schools to draw on young people's first-hand knowledge of the labour market through part-time work performed within the framework of career-education programmes (Greene and Staff, 2012^[34]), like the successful Finnish School to Work Group Method preparatory programmes assessed by (Koivisto, Vuori and Vinokur, 2010^[35]). Yet schools have historically failed to draw on such opportunities to encourage critical reflection and career exploration among their students.

Longitudinal analyses of the long-term impacts of part-time employment tend to highlight greater financial returns in relation to steady employment over a longer duration (Light, 1999^[36]; Staff and Mortimer, 2008^[37]). Such findings may help explain why US summer job programmes consistently fail to correlate with long-term economic benefits: they are too brief. However, exceedingly long working hours that end up significantly damaging academic prospects should clearly be avoided. Students working such long hours can be seen as having at least one foot already in the labour market, with short-term gains in smoothing the transition to adult employment potentially leading to longer-term losses linked to weaker academic credentials.

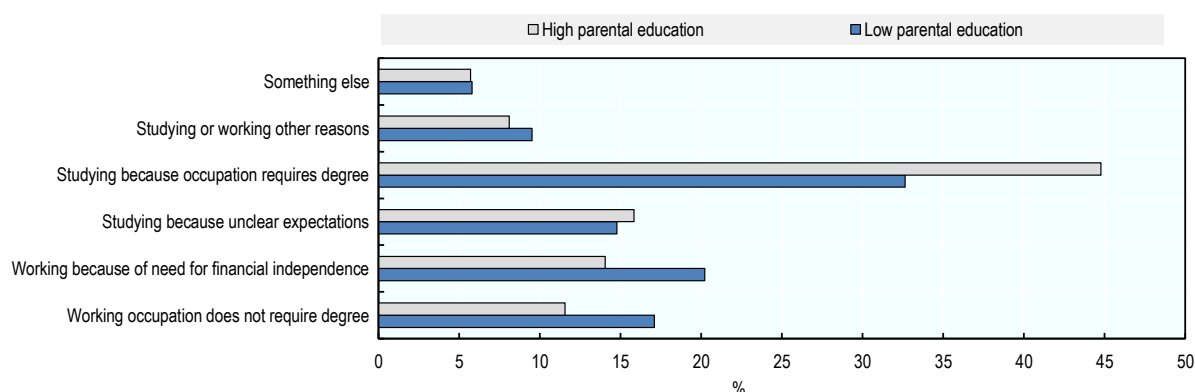
Depending on their socio-economic background, students have vastly different expectations for work and study. Socio-economically disadvantaged students are more likely to expect to be working rather than studying at age 20, partly because they need to be financially independent and partly because their intended occupation does not require a diploma or university degree. By contrast, socio-economically advantaged students are more likely to expect to be studying at age 20, because their intended occupation requires tertiary qualifications. Figure 3.18 indicates that on average across OECD countries with available data, 17% of 15-year-old students whose parents did not obtain a tertiary-level degree reported they expected to be working rather than studying at age 20 because their preferred occupation did not require a study degree. By contrast, only 12% of 15-year-olds with at least one tertiary-educated parent expected to be working.

Differences in expectations are only partially explained by differences in achievement among socio-economically advantaged and disadvantaged groups (see the supplementary online tables for Chapter 3 in Annex Table 3.A.1): while 33% of students without a tertiary-educated parent expected to be studying because their intended occupation requires a degree, 45% of 15-year-olds with at least one tertiary-educated parent also expected to be studying.

Figure 3.18 indicates that financial considerations weigh more heavily on socio-economically disadvantaged students: 20% of 15-year-olds without a tertiary-educated parent said they expected to be working at age 20 because they need to be financially independent, compared to only 14% of 15-year-olds with a tertiary-educated parent.

In recent years, the OECD and other research organisations have devoted considerable energy to understanding good practice in the organisation and delivery of guidance and orientation programmes. Best practices include starting early, when youngsters are still in school, and ensuring that guidance is delivered by trained professionals. The aim is to give learners agency and access to learning or labour-market opportunities that will allow them to realise their long-term life objectives. Consideration should be given not only to individuals' academic strengths and preferences, but also to present and future labour-market needs. Guidance and orientation should refrain from reinforcing stereotypes, ensuring that irrespective of gender, socio-economic condition and migrant status, individuals can embark on lifelong learning with the aim of leading economically active and socially engaged lives.

Figure 3.18. Disparities in medium-term work and study plans, OECD average



Note: Estimates refer to the OECD average among countries that administered the Educational Careers Questionnaire. Country-specific results are available in the supplementary online tables for Chapter 3. See Annex Table 3.A.1. “High parental education” refers to 15-year-olds who reported that at least one of their parents had a tertiary qualification. “Low parental education” refers to 15-year-olds who reported that neither parent had a tertiary qualification.

Source: OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

StatLink  <https://stat.link/rhq5os>

The role of expectations

Educational and career guidance is all the more important given the rapid technological and social transformations underway. In the past, youngsters were inspired by their parents and immediate social circles to evaluate the appeal of different professions. However, many of the occupations that exist today will have changed profoundly by the time today’s youth enter the labour market. Chapter 5 details the rising number of workers who will need to undergo upskilling or reskilling to find employment in new and growing sectors, since their current jobs may disappear as a result of technological innovations and automation. However, changing sectors and reskilling is harder than seeking work in occupations where human work is complemented by technological innovations, rather than replaced by new technologies. This section examines to what extent youngsters who are about to complete compulsory schooling expect to work in occupations that are projected to shrink in the future, providing an indication of those areas where 15-year-olds may especially require guidance and orientation.

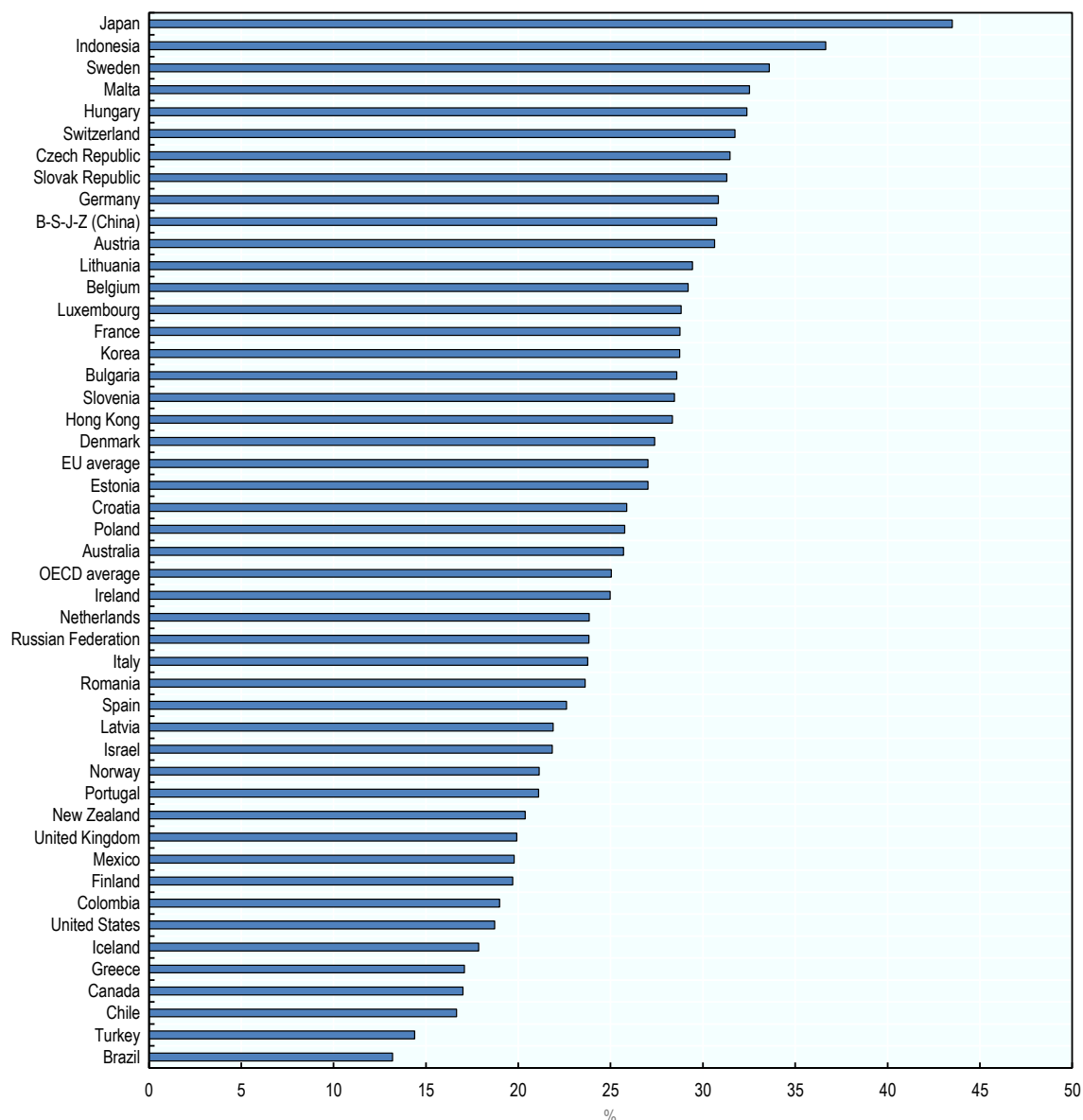
In the absence of country-specific projections on the jobs that will grow or shrink in the near future, projected changes in labour demand in the United States are used to define growing and shrinking occupations. The trajectory of industrial and occupational evolutions in the United States are also observed in other countries, including in Europe (Goos, Manning and Salomons, 2009^[38]). In fact, technological advances are a relatively global phenomenon, affecting the employment structure of countries at different levels of economic development (Conte and Vivarelli, 2011^[39]; Rodrik, 2018^[40]). The interpretation of the results should nonetheless be considered with caution. In some countries, patterns will be similar to those observed in the United States. In others – particularly those at the frontier of technological adoptions, such as Korea or Japan (OECD, 2020^[41]) – projections based on evidence from the United States may understate the expected changes. In yet other countries, particularly those lagging behind the United States in technology adoption, results may overstate the pace of change.

Moreover, the projection also reflects demographic changes in the United States, which might not be aligned with demographic changes in other countries. For instance, the estimated growth of service

occupations associated with population ageing in the United States may be less marked than in countries experiencing faster population ageing, such as Germany, Italy and Japan. Finally, the projection's methodology considers both the demand and supply sides of the labour market. Therefore, the expected impact of policies must also be considered in a general framework, since the projection itself changes in response to policy interventions. For instance, if a country promotes the participation of women in occupations that are expected to experience shortages in skilled labour, that policy will also have a feedback effect on other occupations, such as household support and childcare.


Figure 3.19 illustrates the percentage of 15-year-old students who indicate they expect to work in an occupation that is projected to shrink between 2019 and 2029. The match is based on students' reports on the job they expect to hold at age 30 and linked to projections from the U.S. Bureau of Labor Statistics. On average across OECD countries, 25% of 15-year-old students in 2018 expected to work in occupations that are projected to shrink between 2019 and 2029. Among OECD countries, Japan had the largest proportion (43%) of 15-year-old students who expect to work in occupations with declining employment prospects, compared to over 20% of 15-year-old students in Korea, Hungary, the Czech Republic, the Slovak Republic and Austria. Turkey, Colombia and Chile had the smallest share of students who expected to work in a shrinking occupation.

Figure 3.19. Percentage of 15-year-old students who expect to work in an occupation projected to decline between 2019 and 2029, by country



Note: A shrinking occupation is defined as 4-digit occupations at the bottom quartile of the projected change in employment share between 2019 and 2029. Employment projection comes from the U.S. Bureau of Labor Statistics and is based on the United States. Employment share change was calculated after converting the occupational classification into ISCO-08 (from OES2019 via SOC2010), using the crosswalk tables provided by the U.S. Bureau of Labor Statistics. BS-JZ (China): Beijing, Shanghai, Jiangsu and Zhejiang (China).

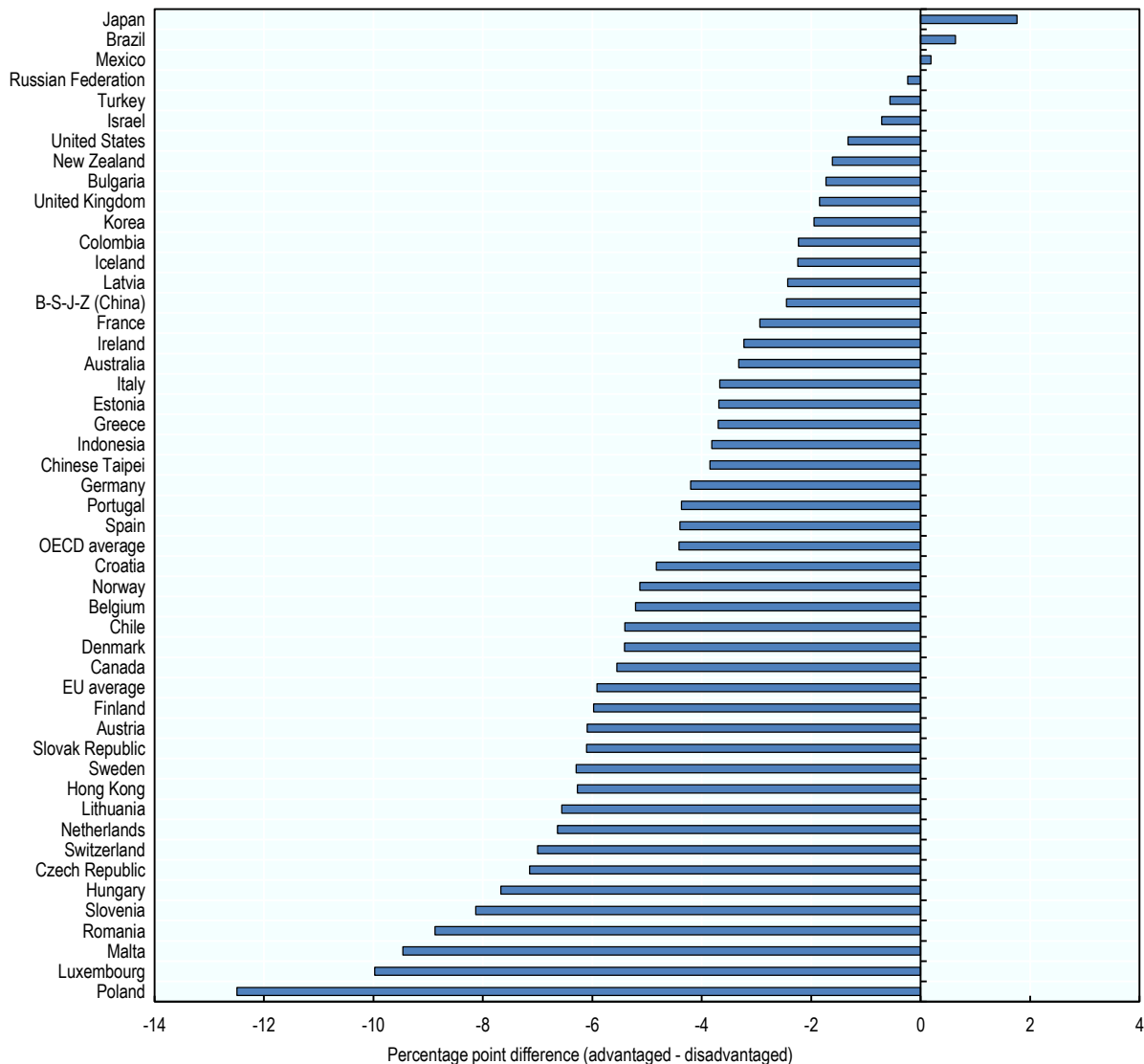
Source: OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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Not all students have equal expectations concerning their future occupation: in many countries, male students and students without a tertiary-educated parent are more likely to expect to work in a shrinking occupation than female students and students with at least one tertiary-educated parent. On average across OECD countries, 27% of male 15-year-old students in 2018 expected to work in an occupation

projected to shrink over 2019-29 compared to 23% of female 15-year-old students, a difference of 4 percentage points. Gender differences are the largest in the Czech Republic, the Slovak Republic and Ukraine, where the gender gap is greater than 10 percentage points. By contrast, female students in Latvia are more likely to expect to work in occupations that are expected to shrink, and the gender gap is large (10 percentage points) (data available in the supplementary online tables for Chapter 3 in Annex Table 3.A.1).

Figure 3.20. Socio-economic differences in the percentage of 15-year-old students who expect to work in a shrinking occupation, by country



Note: A shrinking occupation is defined as 4-digit occupations at the bottom quartile of the projected change in employment share between 2019 and 2029. Employment projection comes from the U.S. Bureau of Labor Statistics and is based on the United States. Employment share change was calculated after converting the occupational classification into ISCO-08 (from OES2019 via SOC2010), using the crosswalk tables provided by the U.S. Bureau of Labor Statistics. BS-JZ (China): Beijing, Shanghai, Jiangsu and Zhejiang (China).

Source: OECD (2018^[29]), *PISA database 2018*, <http://www.oecd.org/pisa/data/2018database/>.

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The results presented in Figure 3.20 suggest that socio-economically disadvantaged 15-year-old students are generally more likely than socio-economically advantaged 15-year-old students to expect to work in occupations that are projected to shrink between 2019 and 2029. On average across OECD countries in 2018, 27% of students whose parents had low levels of educational attainment and 23% of students with at least one tertiary-educated parent expected to work in shrinking occupations by age 30, a difference of 4 percentage points. Socio-economic differences were most pronounced in Austria, Switzerland, the Czech Republic, Norway, Germany, Indonesia, Slovenia and Thailand, amounting to at least 5 percentage points.

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Annex 3.A. Supplementary tables

Annex Table 3.A.1. List of online tables for Chapter 3

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Tables 3.3a, 3.3b and 3.3c	Comparisons in literacy achievement between the PISA 2000 cohort and PIAAC participants at age 27, 26-28, and 25-29, centiles
Tables 3.4a, 3.4b and 3.4c	Comparisons in literacy achievement between the PISA 2000 cohort and PIAAC participants at age 24, 23-25, and 22-26, median and mean
Tables 3.5a, 3.5b and 3.5c	Comparisons in literacy achievement between the PISA 2003 cohort and PIAAC participants at age 24, 23-25, and 22-26, centiles
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Table 3.14a, 3.14b and 3.14c	Comparisons in literacy achievement between the PISA 2006 cohort and PIAAC participants at age 21, 20-22, and 19-23, by number of books and parental education
Numeracy comparisons by number of books and parental education	
Table 3.15a, 3.15b and 3.15c	Comparisons in numeracy achievement between the PISA 2003 cohort and PIAAC participants at age 24, 23-25, 22-26 by number of books and parental education
Table 3.16a, 3.16b and 3.16c	Comparisons in numeracy achievement between the PISA 2006 cohort and PIAAC participants at age 21, 20-22, and 19-23 by number of books and parental education

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4 Promoting interest and participation in adult learning

This chapter presents evidence on participation in work-based adult learning and individuals' willingness to avail themselves of learning opportunities across countries and population groups. It illustrates factors at the individual, firm and system level associated with the likelihood of individuals disengaging from adult learning through a lack of participation or interest. The chapter reviews the barriers preventing willing individuals from participating in adult learning. It concludes by developing estimates of the likely learning losses workers have experienced as a result of COVID-19, with a particular emphasis on the impact of the pandemic on disparities in skill development.

Disparities in participation in adult learning

Information and communications technologies (ICTs), and advances in artificial intelligence and robotics, are transforming the way people work, communicate and live (OECD, 2019^[1]). For example, OECD analysis undertaken before the COVID-19 pandemic finds that on average across the countries that participated in the Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC), about 14% of workers face a high risk that their jobs will be automated, and another 32% face significant changes in their job tasks owing to automation (OECD, 2019^[2]). However, the COVID-19 pandemic has increased the pace of technological change, accelerating the processes of automation and job transformation. This acceleration of the digital transformation has had unequal impacts. Some sectors, such as retail trade; accommodation and food services; and arts, entertainment and recreation, have been unable to operate owing to mandatory shutdowns in many countries and economies during the first phase of the pandemic (corresponding to March-July 2020 in many countries). Other sectors have been able to set up remote working arrangements. Most sectors are not expected to fully resume operations until effective treatments or vaccinations have been developed and widely distributed.

The impact of the COVID-19 pandemic on skill needs in the labour market interconnects with earlier trends, such as globalisation, influencing labour markets. Expanding global value chains (GVCs) may lead to reduced demand for some skills as certain tasks and activities are offshored, exposing workers to wage moderation or decreases – or even unemployment – in the short term. On the other hand, thanks to GVCs, firms can engage in production processes they might not have been able to undertake on their own. In the long term, offshoring enables firms to reorganise production and achieve productivity gains that may lead to aggregate job creation. The evidence suggests that moving up GVCs raises demand for high-level skills that are crucial for countries wishing to specialise in the most technologically advanced industries and complex business services, negatively influencing labour-market participation and returns for low-skilled workers (OECD, 2017^[3]; OECD, 2019^[4]).

Declining fertility rates and increasing life expectancy are leading to population ageing in many OECD member countries. The decreasing cohort of youth entering the labour market and longer life expectancy are creating pressures for societies to prolong adults' working lives – and, by extension, to upskill and reskill the workforce over the life course.

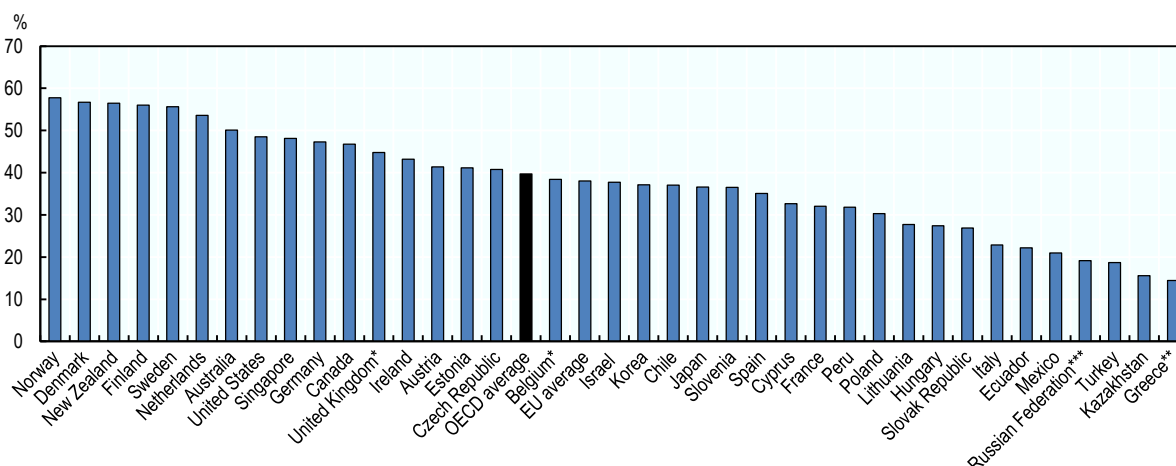
Despite increasing recognition of learning systems' key role in promoting lifelong learning, in many countries, adult learning systems are not yet able to capitalise on technological innovation to deliver effective and inclusive skill development programmes. Such programmes should be designed to reach different socio-economic groups (particularly individuals at risk of skill obsolescence) at all stages of life, to help them weather economic and social changes.

Adult learning covers learning that occurs in formal settings, such as vocational training and general education, and learning resulting from participation in formal, non-formal and informal training. It ranges from certified courses (formal training), through workshops and employer-provided training (non-formal training), to learning from others, learning by doing and learning new things at work (informal training). For analytical purposes, this chapter considers that individuals are engaged in adult learning if they participated in at least one form of either formal or non-formal job-related learning in the 12 months prior to being interviewed.

In many OECD countries, participation in adult learning remains low. Data from the Survey of Adult Skills (PIAAC) indicate that only 2 in 5 adults (40%) on average participate in job-related formal or non-formal training over the course of 12 months prior to being interviewed in PIAAC. However, participation in adult learning differs greatly across countries: fewer than 25% of adults in Greece, Italy, Mexico and Turkey reported having participated in adult learning, compared to over 55% in Denmark, Finland, New Zealand, Norway and Sweden.

Figure 4.1. Participation in adult learning, by country

Percentage of 25-65 year-olds who report having participated in adult learning




Note: Percentage of 25 to 65-year-olds who report having participated in at least one form of formal or non-formal adult learning opportunity for job-related reasons in the 12 months preceding the interview. Countries are sorted in descending order of the percentage of adults reporting to have participated in adult learning.

*Data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland jointly.

**The data for Greece include a large number of cases (1 032) in which there are responses to the background questionnaire but where responses to the assessment are missing. Proficiency scores have been estimated for these respondents based on their responses to the background questionnaire and the population model used to estimate plausible values for responses missing by design derived from the remaining 3 893 cases.

***Note: Regarding data from the Russian Federation in the Survey of Adult Skills (PIAAC) – the sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in the Russian Federation but rather the population of the Russian Federation excluding the population residing in the Moscow municipal area. More detailed information regarding the data from the Russian Federation as well as that of other countries can be found in the Technical Report of the Survey of Adult Skills, Third Edition (OECD, 2019^[5]).

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

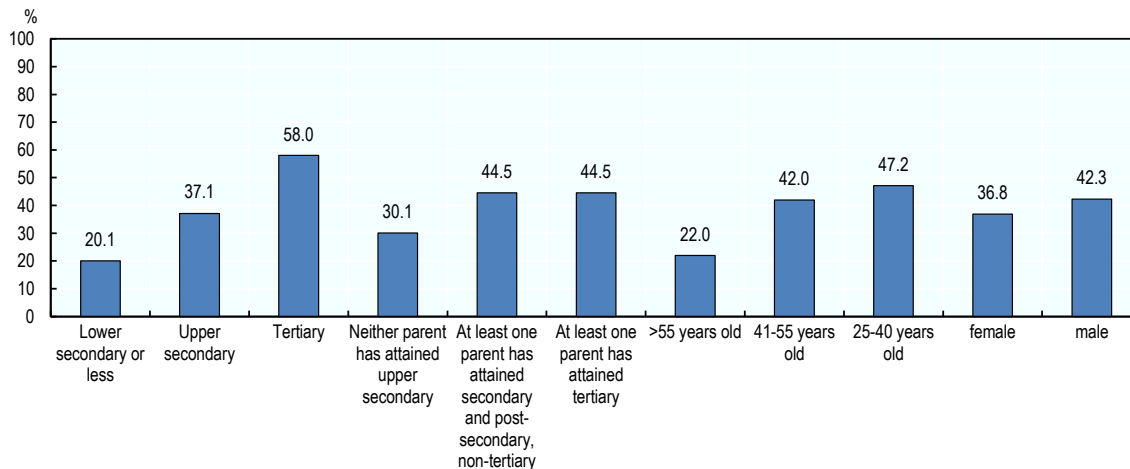
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Participation was often highest among individuals who faced low barriers to participation and reap high individual returns, but whose participation yields lower social returns; these are individuals with high levels of education, young workers and those from socio-economically advantaged households. In many countries and economies, therefore, the key challenge is to include those groups that would most benefit from accessing high-quality learning opportunities, and whose participation would yield higher social returns. Financial barriers, the cost of training, as well as the relevance and quality of the training provided, appear to be the main obstacles to participation in training.

Adults with lower levels of education are much less likely than their more highly educated peers to participate in adult learning. For example, across OECD countries, adults with low levels of educational attainment (i.e. they did not obtain upper-secondary qualifications) are three times less likely to participate in adult learning than individuals with tertiary qualifications. Figure 4.2 shows that on average, only around 20% of adults without upper-secondary qualifications reported participating in at least one adult learning opportunity in the past year, compared to 58% of adults with a tertiary-qualification.

Figure 4.2. Participation in adult learning, by socio-demographic characteristics

Percentage of 25-65 year-olds who reported participating in adult learning



Note: Percentage of 25-65-year-olds who reported participating in at least one form of formal or non-formal adult learning opportunity for job-related reasons in the 12 months preceding the interview. Tertiary-level qualifications refer to International Standard Classification of Education (ISCED)-97 levels 5-6. Upper-secondary qualifications refer to ISCED-97 levels 3-4. Below upper-secondary level qualifications refer to ISCED-97 levels 1-2.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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The intergenerational transmission of educational advantages has been widely documented: individuals whose parents obtained tertiary-level qualifications are more likely to obtain a tertiary degree than individuals whose parents did not pursue tertiary education (OECD, 2017^[9]). Figure 4.2 indicates that parental education is linked not only to the qualifications obtained by their children, but also with their level of participation in adult learning. On average across OECD countries, 30% of individuals whose parents did not reach upper-secondary education report engaging in adult learning, compared to 54% of individuals with at least one parent who obtained a tertiary degree, a difference of 24 percentage points.

Middle-aged (41-55 years old) – and particularly older adults (56-65 years old) – are other groups that tend to be underrepresented among participants in adult learning, even though these workers often need to upskill or reskill to operate in labour markets transformed by technological change (Paccagnella, 2016^[10]). Figure 4.2 indicates that across OECD countries, 42% of 41 to 55 years-old adults but 47% of 25 to 41-year-olds reported having participated in adult learning, a difference of 5 percentage points. Participation falls even more sharply among adults over the age of 55, with only 22% reporting they had participated in adult learning over the past 12 months. Participation in adult learning also varies by gender, but differences are generally small: on average across OECD countries, 37% of women and 42% of men reported having participated in adult learning, a difference of 5 percentage points (Figure 4.2).

The key finding of the analyses presented in this section is that in many countries, large sections of the adult population do not participate in adult learning; in many cases, those who do not participate tend to be from socio-economically more disadvantaged groups. In particular, individuals with few educational qualifications or who come from households with few educational qualifications, as well as mature individuals, are less likely to pursue adult learning than other population groups. Given the important role adult learning can play in promoting economic growth and social inclusion, the OECD has undertaken an ambitious programme of work to gain a better understanding of the functioning, effectiveness and resilience of adult learning systems, as well as identify and disseminate best practices across member countries and beyond. Box 4.1 summarises key resources arising from past work conducted by the OECD.

Box 4.1. Key OECD resources to evaluate the functioning, effectiveness and resilience of adult learning systems

- The OECD dashboard on Priorities for Adult Learning supports countries in assessing and increasing the future-readiness of adult learning systems. The dashboard facilitates cross-country comparisons of relevant aspects of adult learning systems. It presents a set of internationally comparable indicators along seven dimensions: 1) urgency; 2) coverage; 3) inclusiveness; 4) flexibility and guidance; 5) alignment with skill needs; 6) perceived training impact; and 7) financing (OECD, 2019^[11]).
- The report *Getting Skills Right: Future-Ready Adult Learning Systems* (OECD, 2019^[2]) highlights key emerging challenges in adult learning and presents examples of policy initiatives in OECD countries. The report also features concrete policy recommendations to help OECD countries increase the future-readiness of their adult learning systems in a changing world of work. These include improving the coverage and inclusiveness of adult learning systems, and aligning the training offer with the needs of the labour market. The report also discusses the importance of monitoring the quality and effectiveness of training; ensuring the right mix of co-financing by the government, employers and individuals; and strengthening horizontal and vertical co-ordination mechanisms (OECD, 2019^[2]).
- The OECD has produced the “Getting Skills Right” series on specific aspects of getting adult learning systems ready for the future, including “Engaging low-skilled adults in learning” (OECD, 2019^[12]), “Creating responsive adult learning systems” (OECD, 2019^[13]) and “Making adult learning work in social partnership” (OECD, 2019^[14]). Designed for stakeholders involved in adult learning policies, the booklets aim to encourage engagement in adult learning; improve the design, implementation and monitoring of adult learning policies; and effectively involve social partners. Each booklet outlines seven actionable principles, providing insights on how to translate policy recommendations into practice by highlighting promising initiatives in OECD and emerging countries. The OECD is also helping individual countries address specific challenges and priorities in making their adult learning systems future-ready, adding to the evidence base on best practices that enhance the responsiveness and effectiveness of adult learning systems. Country reports in the series for Italy (OECD, 2019^[15]) and Australia (OECD, 2019^[16]) specifically focused on adult learning, as well as a report dedicated to successful reforms that have helped increase participation in adult learning across OECD countries (OECD, 2020^[17]).

Source: OECD (2019^[4]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

The importance of distinguishing motivation: Four learners’ profiles

The previous section detailed how participation in adult learning remains low in many countries, with differences in participation across key socio-demographic groups that are generally pronounced. Recent OECD analysis (e.g. OECD (2019^[18]; 2019^[2]; 2019^[12])) highlighted explicit barriers to participation in training, including financial and time constraints (related to work or family obligations), insufficient prerequisites for participation and lack of interest in the training on offer. However, these are not the only factors hindering participation.

Figure 4.3 illustrates that on average across OECD countries, one in two 25 to 65-year-old workers (50%) does not participate in adult learning and is not willing to participate in the currently available training for job related reasons. These adults are “disengaged” (see Box 4.2). Rather than being prevented from

participating owing to financial, personal or other constraints, they lack willingness or the opportunity to engage in available learning opportunities readily available. Figure 4.3 shows considerable variability across countries in the prevalence of different learner profiles. In the OECD region, Turkey has the largest share (79%) of individuals disengaged from available training, more than double the share of New Zealand (28%) or Denmark (32%). It is important to note that data refer to the OECD Survey of adult Skills (PIAAC) and are therefore not the latest available source of information for some countries and the situation may have evolved in some countries. For example, for the European region the 2016 Adult Education Survey (AES) is available. However, PIAAC remains the study that allows for the widest cross-country comparison across OECD countries. Direct comparisons between AES and PIAAC are not straightforward because of differences in question working and response options. Similarly, Labour Force Surveys allow to monitor participation in adult learning but do not generally contain information on interest in and barriers to participation.

On average across OECD countries, only 26% of 25 to 65-year-olds are engaged in adult learning and satisfied with their level of participation (the “active and satisfied”). Figure 4.3 reveals a large variability across countries: in Norway and the Netherlands, 39% and 37% of 25 to 65-year-olds respectively are engaged in adult learning and satisfied with their current participation levels compared to only 10% of the adult population in Greece.

An additional one in ten 25 to 65-year-olds (10%) reports being motivated to participate in available training, but being unable to do so because of different barriers (the “inactive but motivated”). Figure 4.3 indicates that among OECD countries, Korea has the largest share (18%) of adults who do not participate in adult learning but are willing to train.

Finally, 14% of 25 to 65-year-olds adults report they participate in adult learning, but are willing to train more (the “active and seeking more”), although they mention various barriers that leave them dissatisfied with the amount of training that is currently available. In New Zealand, for example, 24% of adults are engaged in adult learning, but express an interest in pursuing additional training.

Each of the four groups above represents a unique “learner’s profile” (described in detail in Box 4.2), with different needs, propensity and interest towards adult learning. Throughout this chapter, the term “willingness to train” is used to refer to individuals’ inclination towards training, rather than their actual participation level. As such, adults are considered “willing to train” if they belong to one of the three categories – “active and satisfied”, “active seeking more” and “inactive but motivated”.

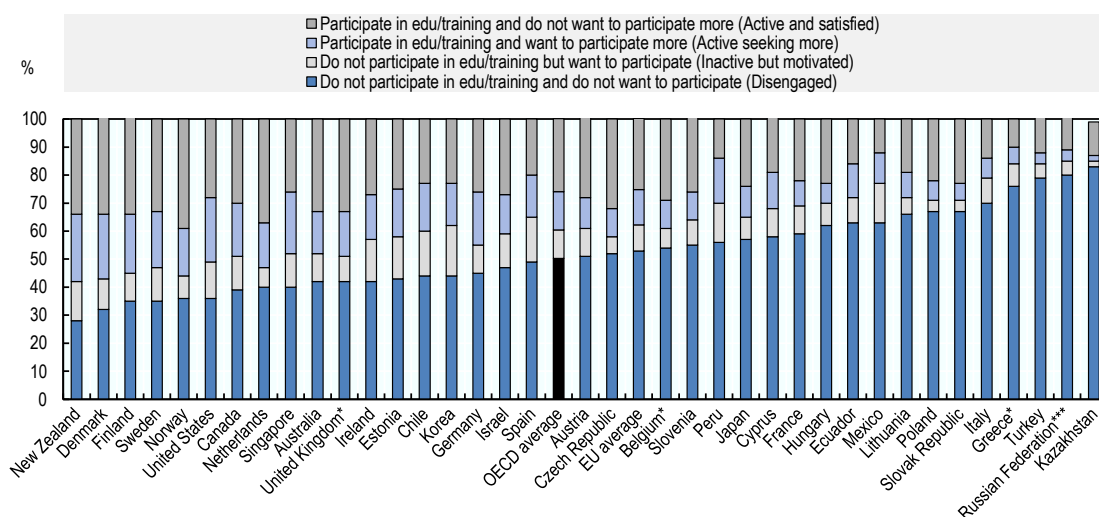
Box 4.2. Four lifelong learner profiles

This chapter distinguishes four groups of adults, based on their willingness to participate and their level of participation in adult learning opportunities that are currently available to them.

- **Inactive and disengaged** – adults who do not participate in adult learning available through their work and declare no interest and availability in participating in such training.
- **Inactive but motivated – not in training, but express a desire to learn** – adults who declare a willingness to engage in training currently available to them, but do not currently participate in training.
- **Active and seeking more – in training, but would like to learn more** – adults who participate in existing training opportunities, but declare they are willing to undertake more training than what they are currently receiving.
- **Active and satisfied – in training, and satisfied with the amount of their learning** – adults who participate in training and are satisfied with the quantity of training (are not looking to participate more).

Figure 4.3. Learner's profiles characterising willingness to train and participation in adult learning, by country

Percentage of 25-65 year-olds who completed initial education



Note: Participation relates to formal and non-formal job-related adult learning over the 12 previous months. Countries are sorted by the share of the “disengaged” group in a given country. Countries are ranked in ascending order of the percentage of 25-65 year-olds having completed initial education who are in the “disengaged” group.

*For Belgium, Greece, the Russian Federation and the United Kingdom, see notes under Figure 4.1.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

StatLink <https://stat.link/6ef8y2>

Factors affecting workers' willingness to participate in training

Previous studies (AONTAS, 2013^[19]; Mooney and O'Rourke, 2017^[20]; Health, 2015^[21]; OECD, 2019^[18]; OECD, 2019^[2]; OECD, 2019^[12]; Pennacchia, Jones and Aldridge, 2018^[22]) have identified the barriers hindering participation in training activities, generally involving material or contextual factors, such as the excessive cost of training or a lack of time owing to family or other obligations. Different sets of factors may eventually result in adults being unwilling to participate in available training opportunities. Data constraints do not allow determining whether the lack of willingness to train arises from supply constraints, i.e. a lack of opportunities that are aligned with individuals' preferences and interests. Indeed, the results presented in Figure 4.3 suggest that a sizeable share of adults are not willing to avail themselves of existing training provisions. This section examines the factors associated with individuals' disengagement from available training, by identifying the characteristics of disengaged workers,¹ i.e. workers who reported not participating in available training and not being willing to do so when interviewed in the context of the Survey of Adults Skills (PIAAC). It considers three sets of factors in relation to workers' willingness to participate in available adult learning:

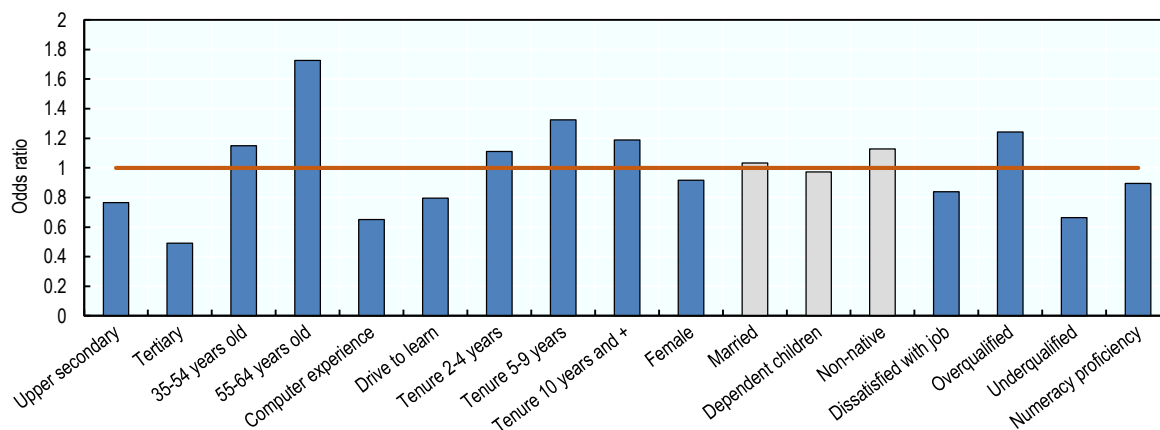
- Worker's characteristics**, including gender, age, educational attainment, numeracy proficiency, experience with computers and ICT, marital status, care responsibilities for dependent children, language background, job satisfaction, tenure, being over- or underqualified for the job and learning attitudes (measured by their reported “drive to learn”²).
- Job characteristics**, such as part-time employment, working on an atypical contract,³ supervising others at work, experience required to perform the job and risk of automation.
- Employer characteristics**, including the firm's size, whether it is growing and whether it operates in the private sector; and use of high-performance work practices (HPWP) and performance-based pay.

Personal factors related to workers' willingness to participate in adult learning

This section identifies personal characteristics associated with the likelihood that workers will be disengaged from learning or on the contrary, will be willing to participate in available learning opportunities. Figure 4.4 summarises associations across OECD countries. The supplementary online tables to Chapter 4 illustrate country-specific results (see Annex Table 4.A.1).

Figure 4.4. Personal factors related to workers' likelihood of being disengaged from available adult learning

Logit regression odds ratios



Note: The results presented refer to odds ratios derived from a logit regression model pooled across OECD countries that includes 25-65 year-old workers. The dependent variable “willingness to train” is constructed to take value 1 if the respondent reports being willing to participate in job-related training (whether or not the individual is currently participating in training or is satisfied with the amount of training currently being received), and value 0 if the individual reports no interest in participating in training. The regression includes additional controls for individual, job and employer characteristics. For categorical variables, odds ratios refer to a discrete change from the base level (respectively: holding lower-secondary education or below, 25-34 year-olds, without computer experience, 0-2 year tenure, male, unmarried, without dependent children, native). Grey columns indicate results that are not statistically significant at the 95% confidence level. The supplementary online tables for Chapter 4 present country-specific results. See Annex Table 4.A.1.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

StatLink  <https://stat.link/zlje96>

Educational attainment: The role of prior learning

Individuals with low educational qualifications are more likely to have relatively low skill proficiency and to be employed in occupations that are at high risk of being offshored or automated (OECD, 2019^[12]). Despite strong implicit incentives for workers with low qualification levels to develop their skills by participating in adult learning, Figure 4.4 indicates that across the OECD region, less-educated workers are less willing to participate in available adult learning and training. Workers are often caught in a “low skills trap”, employed in low-quality jobs with weak career prospects, and few opportunities and incentives to engage in learning. The lack of perceived prospects for career progression can discourage workers from participating in training – all the more so as the limited potential long-term gain does not outweigh the short-term cost (i.e. workers are reluctant to signal their unhappiness with their current position to their employer by searching for training opportunities that enhance their employability).

Figure 4.4 indicates that across countries participating in the Survey of Adult Skills (PIAAC), people who had completed tertiary education were half as likely to become disengaged from adult learning than people holding qualifications below the upper-secondary level. Country-specific regression results indicate that

other things being equal, differences across countries in individuals' willingness to participate in adult learning according to their educational level are the widest in Lithuania.

The results presented in Figure 4.4 are consistent with data from the 2016 Adult Education Survey indicating that low-skilled adults are considerably less interested in upskilling or training opportunities than other adults. According to the survey, only around one in ten adults with low educational attainment searched for learning opportunities, compared to over one in three adults with high educational attainment (OECD, 2019^[12]).

One reason for this lack of willingness to train may be that the expected returns vary across individuals with different levels of education – and in fact, the returns for non-formal and informal learning are highest for tertiary-educated workers (Fialho, Quintini and Vandeweyer, 2019^[23]). Workers are likely to internalise this evidence when deciding whether (and how much) to participate in training.

Linking wages more closely to productivity is one possible way of providing adequate economic incentives for workers to develop and use their skills in jobs that fully utilise their human capital. However, this link is seldom evident in jobs requiring low skills.⁴ Lower expected returns for low-skilled workers translate into low motivation to participate in available learning activities, as attending training costs both time and money. Some countries have striven to strengthen the link between training and career progression, and to boost virtuous incentives to participate in learning. However, much more remains to be done to generalise these approaches and create an inclusive culture of learning (Box 4.3).

Box 4.3. Linking wages to productivity: A case of best practice

System-level policy interventions

Italy. Among the recent policy interventions to link wages to productivity, the new Budget Bill for 2017 (*Legge di Stabilità*) allows firms to benefit from a substantial tax reduction on the “productivity bonuses” (*premi di produttività*) paid to their most productive workers. However, the use of “productivity contracts”, which explicitly foresee productivity bonuses, is very uneven across the country, and should be strengthened in Italy’s central and southern regions as a tool to spur better skills match.

Firm-level interventions

During the renewal of the collective agreement in 2010, Italy’s Tesmec Group vowed to design a long-term project to enhance its workforce’s professional development. Similarly, trade unions proposed that Tesmec introduce an individual productivity bonus based on objective evaluation procedures and closely tied to workers’ professional performance. In the collective agreement signed in February 2011, these intentions were finally reflected in the New Resource Development project, which established training programmes to meet individual workers’ needs and fill firm’s skill gaps. Tesmec management and the trade unions agreed on a mechanism to link workers’ skills and professionalism to explicit wage incentives and training programmes under a well-defined scheme to evaluate workers’ performances. Such evaluations were to take place annually, with the criteria set collaboratively by managers and employees, supported by the human resources office. Thus, skill assessments are based on shared evaluation parameters, broken down into two main categories (i.e. flexibility and distinctive elements of the performance) and further fragmented into eight evaluation factors, with different weights.

Source: OECD (2017^[24]), *Getting Skills Right: Italy*, <https://dx.doi.org/10.1787/9789264278639-en>; Mosca, D. and P. Tomassetti (2016^[25]), *La valorizzazione economica della professionalità nella contrattazione aziendale in Diritto delle Relazioni Industria*.

A second reason why individuals with low educational qualifications are less willing to pursue available learning opportunities is their lack of awareness of the direct and indirect benefits of learning: as a result many fail to recognise their own learning needs and hence do not seek training opportunities (e.g. (Windisch, 2015^[26])). Targeted career guidance that supports the low-skilled in identifying their skill gaps and available training, and directs them to the most suitable training opportunities, can make training more accessible and provide incentives to participate. Awareness campaigns focusing on the low-educated and low-skilled in particular can be an important means to engage these groups in training.

However, traditional awareness-raising initiatives, such as communication campaigns disseminated through public websites, are largely ineffective (OECD, 2019^[12]; European Commission, 2015^[27]). Some countries have sought innovative ways to increase individuals' willingness to engage in adult learning, with a particular emphasis on interventions targeting those with low or no educational qualifications. Such interventions have often aspired to develop lifelong engagement in learning, given the importance of creating strong learning attitudes from an early age. Such initiatives generally aim to reach individuals in places they attend regularly, such as workplaces and schools (OECD, 2019^[4]). Box 4.4 illustrates several examples of proactive initiatives undertaken in OECD countries to encourage low-skilled adults to participate in adult learning.

Box 4.4. Improving participation in learning

- In the United Kingdom, Unionlearn uses “union learning representatives” to encourage and support other colleagues with learning in the workplace. It provides training to about 250 000 workers every year, including many low-qualified workers (Stuart et al., 2016^[28]; Stuart et al., 2013^[29]).
- In Vienna (Austria), the project *Mama lernt Deutsch!* (“Mama learns German”) provides courses on basic skills to mothers with low qualifications and who are not native German speakers. The courses take place in their child’s educational institution (OECD, 2019^[12]).
- In Brussels (Belgium), Formtruck is a mobile training information centre that engages with low-qualified jobseekers at public locations, e.g. events, parks and public squares (OECD, 2019^[12]).
- In France, the following transformations of the educational are currently ongoing:
 - «Loi Avenir professionnel (Loi n° 2018-771 du 5 septembre 2018)», intended to increase the number of apprentices.
 - «Loi Avenir professionnel (Loi n° 2018-771 du 5 septembre 2018)», creation of training accounts.
 - «Plan d’investissement dans les compétences», which provides training to youth and job seekers.

Source: OECD (2019^[4]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

Spurring effective and innovative teaching and learning methods is also key to encouraging participation. Low-skilled adults whose earlier experience in education has been negative often associate traditional classroom learning with failure. They are instead more likely to be motivated by training that is more practical, problem-oriented and that is delivered in ways that make the relevance for day-to-day activities very clear. Some countries have started adopting good practices to engage low-skilled workers in training that is tailored to their initial skill level, needs and experience (see Box 4.5 for examples of good practices).

Box 4.5. Creating interesting and relevant learning opportunities

- Blended learning is key to General Assembly's approach to education. General Assembly is a primarily US-based private education provider of training in today's most in-demand skills, such as coding, data design and digital marketing. While its courses typically target adults with high skill levels, its approach to blended learning is likely to be relevant for low-skilled adults as well. At General Assembly, individuals can learn a given skill in different ways, including online self-learning, expert-instructed classroom learning and small-group learning. Key to the approach is that although the best results can be achieved when individuals follow the full blended model, each learning mode is stand-alone, i.e. individuals can decide to learn using only their preferred method.
- Story-based learning lies at the core of the German eVideoTransfer project. Since 2012, the project has offered digital learning opportunities to workers with low basic skills and limited time to participate in classroom learning. This project develops industry-specific training, combining instruction on basic skills and professional knowledge. All training is web-based and takes the learner through an engaging storyline, which is conveyed through videos. Users must have a basic level of digital literacy, although a learning module about how to use a mouse and keyboard was developed to reach a wider target group. EVideoTransfer is implemented by the education provider Arbeit und Leben and funded by the Germany Ministry of Education and Research.

Source: OECD (2019^[12]), "Getting Skills Right Engaging low-skilled adults in learning", <https://www.oecd.org/employment/emp/engaging-low-skilled-adults-2019.pdf>.

Age-related differences

As workers approach the retirement age, their willingness to invest in adult learning often decreases because of the shortening payback period associated with investments in learning (Martin, 2018^[30]). In parallel, mature workers' ability to acquire new skills can deteriorate, particularly for workers whose jobs do not allow them to effectively utilise their skills (OECD, 1998^[31]). Gerontological research suggests that advancing age impairs the ability to learn quickly, especially when new materials are qualitatively different from those mastered previously (Warr, 1994^[32]). Firms may also prioritise younger workers, tailoring the training offer to a different demographic and in so doing, lessening older workers' interest in (and the benefits of) the available learning opportunities.

Figure 4.4 confirms that older workers are more likely to be disengaged from available learning opportunities than younger workers. On average across OECD countries, workers aged 55-65 are almost twice as likely to be disengaged than the younger cohort of workers. Data presented in the supplementary online tables for Chapter 4 suggest that age differences are especially pronounced in some countries (see Annex Table 4.A.1). In Greece, for example, workers aged 55-65 are five times more likely to be disengaged from available adult learning opportunities than 25-34 year-old workers.

These results should be considered in light of increases in life expectancy and the resulting prolongation of working lives owing to postponement of the retirement age in many OECD countries. Targeted career guidance can help mature workers make informed decisions about their investment in further skill development. In addition, financial incentives that reduce the relative cost of training older workers can encourage employers to tailor training and make it more relevant to their needs (OECD, 2019^[2]). Many OECD countries have put in place policies promoting older adults' participation in training. Box 4.6 highlights good-practice examples of career advice and guidance services targeting mature workers.

Box 4.6. Policies aiming to increase training participation of older adults through targeted career advice and guidance

- Since mid-2018, Australia has been trialling the new Career Transition Assistance programme for job seekers aged 50 and above in five regions. The programme combines tailored career assistance and functional digital literacy training, using different types of technology (OECD, 2019^[2]).
- In the Netherlands, workers aged 45 and more can participate in subsidised career development guidance (*ontwikkeladvies*) that help them understand the future prospects of their current job, and give them insight into their skills profile and career opportunities. Participants develop a personal development plan that describes the actions that should be taken to ensure they remain employed until retirement age (OECD, 2019^[2]).
- In Korea, Job Hope Centres offer re-employment services for vulnerable individuals aged 40 and above, including counselling and guidance services for older workers who need (re)training before starting their job search and often lack the basic ICT skills needed to use online services. Almost 30 000 people benefited from this programme in 2017 (OECD, 2018^[33]).
- Switzerland's *Impulsprogramm*, running from 2020 to 2022, supports older adults (50+) in their job search by providing the cantonal employment services with additional funds to implement measures such as coaching, counselling and mentoring tailored to their needs. In addition, workers aged 40+ benefit from a free location assessment service. Finally, the accreditation process for existing competencies is being improved.

Source: OECD (2019^[4]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

Experience with technology

In parallel with the demographic changes worldwide, the fast-evolving technological landscape is exerting growing pressure on workers to upskill and reskill. Some skills can quickly become obsolete, potentially leading to job loss and even early retirement (OECD, 2017^[34]). Even before the COVID-19 pandemic hit, workers in OECD countries were increasingly required to possess at least basic digital capacities. The widespread adoption of digital, remote and smart working arrangements owing to the COVID-19 crisis precipitated the need for individuals to master digital skills. And yet recent studies have shown that many mature adults lack essential digital skills (OECD, 2019^[18]), which are now a precondition for accessing learning delivered on line (Centre for Ageing Better, 2020^[35]). The last section of this chapter examines how the COVID-19 pandemic accelerated the digital transition, with potential additional challenges for economic and social inclusion.

Digital technologies can also be leveraged to promote participation in adult learning among individuals who are not comfortable with the usual training offerings. The use of new technologies (such as web-platforms) to deliver training allows far greater outreach, and more flexible and tailored learning paths. However, individuals with poor digital skills (or who lack internet connectivity) may not be able to take advantage of such opportunities.

Equipping vulnerable (i.e. low-skilled and older) groups with basic digital skills is a key policy priority for virtually all OECD countries as it can boost their confidence and increase their willingness to participate in further training. Figure 4.4 indicates that on average across OECD countries and other things being equal, workers who report having experience with using a computer have considerably lower odds of being disengaged from available learning opportunities, than those who do not. Country-specific results reported in the supplementary online tables for Chapter 4 indicate experience with ICT is associated with an especially strong decrease in disengagement from available adult learning in Austria and the United States, which is not the case in Greece, Italy or Lithuania. Several countries have introduced

programmes to support adults' ability to access online learning by equipping them with basic digital skills (see Annex Table 4.A.1).

Drive to learn

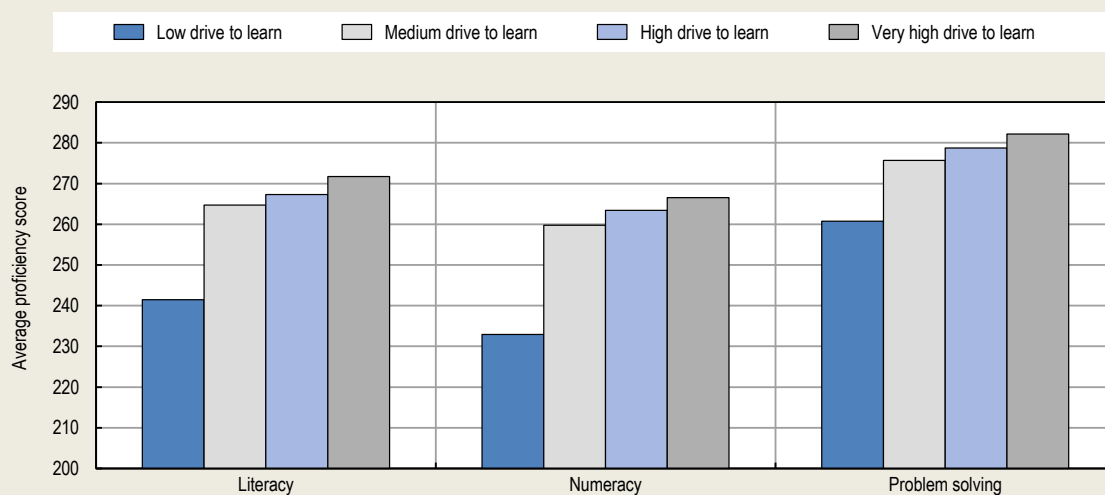
The drive to learn new things, master difficult subjects and look for additional information are individual characteristics that are not developed rapidly, and require specific contextual factors to emerge in an individual's lifelong learning journey.

Such lifelong learning attitudes are usually developed early in school. Chapter 2 provides a thorough analysis of factors (such as parental and teacher support) promoting strong lifelong learning attitudes and the predisposition to learn in young individuals, suggesting that investment in training early in life translates into better outcomes throughout the lifecycle (Cunha and Heckman, 2007^[36]; Cunha and Heckman, 2008^[37]; Cunha, Heckman and Schennach, 2010^[38]). Strong attitudes also have positive effects on an individual's skill development and proficiency (Box 4.7), leading to higher wages (Paccagnella, 2014^[39]) and higher-quality jobs (OECD, 2018^[40]).

Box 4.7. The link between drive to learn and skill proficiency


Figure 4.5 indicates that a strong drive to learn is associated with higher proficiency scores across all the competencies – i.e. literacy, numeracy and problem-solving in technology-rich environments – assessed by the Survey of Adult Skills (PIAAC). The difference between the 25% most-driven and the 25% least-driven individuals corresponds to 21 score points for problem-solving in technology-rich environments, 31 points for literacy and 34 points for numeracy. Individuals who are able to develop positive learning attitudes early on build stronger skills and are on a path for receiving more education at all stages of life.

Figure 4.5. Average proficiency score in literacy, numeracy and problem-solving skills, by participants' drive to learn



Note: Low, medium, high and very high drive to learn refer to the quartiles of the PIAAC "drive to learn" index on the pooled PIAAC sample (covering all adults across all the participating countries).

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Strong learning attitudes developed at a young age play a key role in the willingness to learn as an adult. The results in Figure 4.5 confirm that on average across OECD countries, and other things being equal, individuals who have cultivated a strong drive to learn are considerably less likely to be disengaged from adult learning than those with a low drive to learn. Learning attitudes are a significant predictor of participation in available adult learning in most of the countries examined, highlighting the importance of early investments in developing robust learning attitudes. The association between positive learning attitudes and willingness to participate in adult learning is particularly strong in Chile, New Zealand and Japan (see the supplementary online tables for Chapter 4 in Annex Table 4.A.1).

Previous literature also shows that lifelong learning attitudes are often rooted in individuals' memories of participating in school and formal learning; they are also related to personal judgements about the lack of relevance of adult education to improve life and job prospects. Luchinskaya and Dickinson (2019^[41]), for instance, argue that an individual's experiences in participating in learning activities (e.g. during initial education) can create either positive or negative feedbacks, reinforcing interest and willingness to participate in adult learning. Dispositional barriers and psychological factors (e.g. perception of reward or usefulness of participation and self-perception) may also reduce an individual's desire to participate in training. These barriers are particularly prevalent among the poor, people with weak literacy skills and elderly populations. Although dispositional barriers are socio-psychological, they are often interwoven and interact with institutional and situational barriers (Desjardins, 2009^[42]).

Job tenure

Another factor that can drive interest in training is the novelty of a job (and its tasks) to a worker. Previous literature suggests that employees with low tenure are motivated to invest in their human capital to improve their career prospects and wage progression. As tenure increases, employees' desire to keep learning and training may weaken as they only need to maintain their current human capital so that they do not lose the gained benefits (Renaud, Lakhdari and Morin, 2004^[43]). Similarly, human capital theory suggests that as knowledge and skill increase with greater tenure, job performance improves as well (Ng and Feldman, 2013^[44]), potentially leading to lower interest in training opportunities.

Figure 4.4 indicates that newly employed workers – i.e. individuals whose tenure does not exceed two years – are most likely to be willing to participate in available adult learning, and that willingness to participate in adult learning opportunities tends to be the lowest among individuals with a tenure of five to ten years.⁵ The results presented in Figure 4.4 suggest that workers starting a new job tend to respond to skill demands and incentives by engaging in learning and upgrading their skills. However, it is troubling that workers' willingness to updating their skills appears to diminish over time. Given the rapidly changing labour-market conditions and the quick depreciation of skills that are not put to use, too many workers may be prematurely disengaging from adult learning, only to realise too late that they need to reskill or upskill. This can pose significant risks, especially for those who are unexpectedly made redundant during economic crises.

Countries have different options to minimise the effects of economic crises on workers by supporting their income and strengthening incentives to reskill and, ultimately, transition to a new job. Box 4.8 outlines two Canadian programmes combining income-support and skill development policies to address the needs of long-tenured displaced workers.

Box 4.8. Increasing training participation of long-tenured displaced workers in Canada

- In Canada, legislative responsibility for education is granted to provinces in *The Constitution Act, 1867*; similar responsibilities are delegated to territories by the federal government. As a result, there is no federal ministry of education and no single pan-Canadian approach to adult education and learning. Each province and territory is responsible for planning, implementing, and evaluating policies for adult learning and education (ALE). The provision of ALE programs responding to these needs varies across provinces and territories, depending on the sector and community. Each province and territory adapts its programs based on its specific needs and those of the populations it serves. The Government of Canada also plays an integral role in supporting the skills development of Canadians by investing in postsecondary education, training, and literacy in the form of transfers to provinces and territories, research and infrastructure funding, and direct support to learners.
- The Canadian Career Transition Assistance programme temporarily extended the duration of employment insurance benefits during the 2008 economic crisis to two years for eligible long-tenured displaced workers who participated in longer-term training. Moreover, earlier access to employment insurance benefits was guaranteed for displaced workers who invested in their own training, using all or part of their severance package (OECD, 2015^[45]). As of the third quarter of 2018, eligible employment insurance claimants in Canada who have lost their jobs after several years in the workforce will have more opportunities to continue to receive employment insurance benefits while pursuing self-funded full-time training.
- In Canada, federal funding is used to provide training and employment supports to individuals across Canada through bilateral Labour Market Transfer Agreements with provinces and territories. Training and supports, which are in part funded by these transfers, are designed and delivered by and in provinces and territories to respond to local labour market conditions and to provide better targeted supports to Canadians. For example, in the Canadian province of Ontario, the Second Career programme was introduced in 2015 to provide training assistance to older or long-tenured workers affected by economic restructuring, with the aim of helping them train for new careers in high-demand fields (OECD, 2015^[45]).

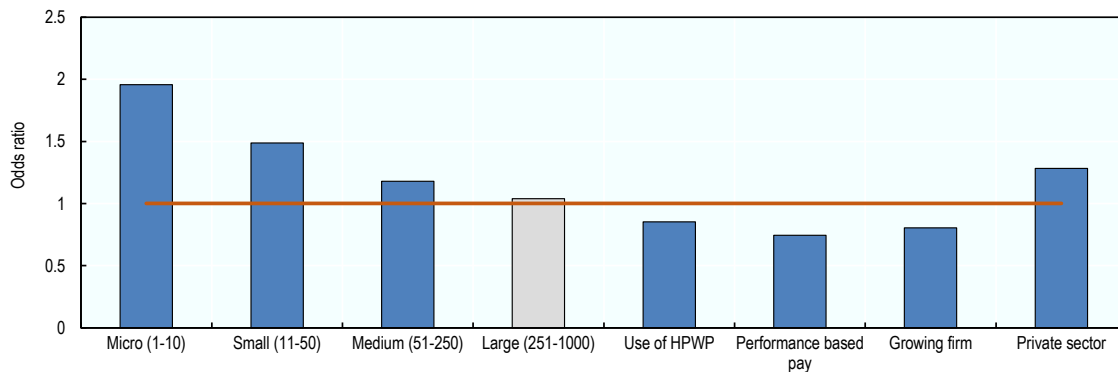
Source: OECD (2019^[41]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

Employer characteristics


This section identifies employer characteristics that are associated with the likelihood that workers will be either disengaged from available learning opportunities. Figure 4.6 summarises associations across OECD countries; the supplementary online tables for Chapter 4 illustrate country-specific results (see Annex Table 4.A.1).

Figure 4.6. Employer characteristics related to workers' likelihood of being disengaged from available adult learning

Logit regression odds ratios



Note: The results presented refer to odds ratios derived from a logit regression model pooled across OECD countries that includes 25-65 year-old workers. The dependent variable “willingness to train” is constructed to take a value of 1 if the respondent reports being willing to participate in job-related training (irrespective of whether the respondent is currently participating in training and is satisfied with the amount of training currently being received), and 0 if the respondent reports not being interested in training. The regression includes additional controls for individual, job and employer characteristics. For categorical variables, odds ratios refer to a discrete change from the base level (respectively: very large firms (>1 000 employees), firms that do not apply HPWP, firms that do not apply performance-based pay, firms that have not grown in size over the 12 months preceding the survey and non-private-sector firms). The grey column indicates results that are not statistically significant at the 95% confidence level. The supplementary online tables for Chapter 4 present country-specific results. See Annex Table 4.A.1. Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Firm size

A wide catalogue of high-quality training courses can certainly spur workers' interest in adult learning. However, not all firms are able to offer a large range of relevant learning options. For instance, small firms generally have fewer resources and fewer employers who need similar training opportunities, so that achieving economies of scale in training opportunities is inherently more difficult. They may also struggle to find temporary replacements for workers engaged in training and have less experience in identifying skill needs. Moreover, because they have smaller (or non-existent) human resources teams, they are generally less capable of producing effective skill development plans (Green and Martinez-Solano, 2011^[46]).

Data from the European Continuing Vocational Training Survey indicate that the share of firms that provide continuing vocational training increases with firm size, suggesting a direct relationship between a firm's resources and its ability to provide training. The data show that over 90% of large firms (with over 250 employees) provide training opportunities to their employees, compared to 76% of medium-size firms (with between 51 and 250 employees) and only 57% of small firms (with 11 to 50 employees).⁶

If resources in smaller firms are scarce and their skill development is poorly planned, workers may perceive the training offer as inadequate and unappealing, eventually losing interest in adult learning. Figure 4.6 indicates that, other things being equal, workers employed in small and medium-sized enterprises (SMEs) are generally more likely to report being disengaged from adult learning than similar individuals who work in larger firms. On average across OECD countries participating in the Survey of Adult Skills (PIAAC),

workers employed in micro firms had twice the odds of being disengaged from available adult learning compared to workers in very large companies (defined as enterprises employing over 1 000 workers). Among OECD countries, workers' motivation to engage in adult learning is more robustly associated with firm size in Turkey and the Slovak Republic (see the supplementary online tables for Chapter 4 in Annex Table 4.A.1).

Growing firm

Results from the Survey of Adult Skills (PIAAC) also indicate that fast-growing firms, i.e. firms that are highly productive and active, are more often able to boost their workers' interest and participation in training. On average across OECD countries, workers employed in firms that are growing in size are less likely to report being disengaged from available adult learning than their counterparts in stable or shrinking companies. This is particularly true of workers in Spain and the Slovak Republic.

Different factors could explain the association between firm growth and workers' willingness to participate in adult learning. On the one hand, growing firms may put more effort into conceiving effective skill development plans, identifying skills gaps in their workforce and providing suitable incentives for their workers to fill those gaps. On the other hand, workers may feel that pursuing skills training in a growing firm may increase their career prospects, as well as help them compete effectively with new hires in a highly dynamic work environment.

Since participation in adult learning does not benefit solely workers and their employers, but also contributes to aggregate productivity, all stakeholders (including the government) should support the effective delivery of training – especially in firms that struggle to provide learning opportunities owing to institutional or contextual constraints. Box 4.9 illustrates a good-practice example of a programme that supports training provision among SMEs, ensuring the inclusion of disadvantaged groups.

Box 4.9. Strengthening on-the-job training in SMEs

France: *Formation en Situation de Travail* (FEST) is an on-the-job training programme targeted to SMEs and promoted by the French Ministry of Labour and social partners since 2014. In order to formalise FEST, the French Ministry of Labour launched a call for training funds (*opérateurs de Compétences*) to develop FEST experiments. In total, 24 projects from 13 organisations were selected to pilot different experiments. These experiments had a few common characteristics: they were only applied in firms with fewer than 300 employees; they prioritised low-skilled individuals and diverse participant profiles, including new hires, experienced workers and unemployed persons. Training included normal work activities and “learning elements” (e.g. moments of reflection). One characteristic of the programme was that small firms with fewer than 50 employees were reimbursed by their training fund for implementing FEST. A recent evaluation of the programme showed that the project was successful in helping participants develop relevant skills, with both learners and managers indicating that the skills acquired were useful for the employee's current professional activity. The project also had positive indirect effects on participants' confidence and autonomy in completing tasks, and helped consolidate their working relations with managers (Case and Freundlieb, 2018^[47]).

Source: OECD (2020^[48]), *Enhancing Training Opportunities in SMEs in Korea*, <https://dx.doi.org/10.1787/7aa1c1db-en>; OECD (2017^[49]), *Getting Skills Right: France*, <https://dx.doi.org/10.1787/9789264284456-en>; Case, F. and I. Freundlieb (2018^[47]), *Expérimentation AFEST. Action de Formation En Situation de Travail*, <https://www.anact.fr/experimentation-afest-action-de-formation-en-situation-de-travail>.

High-performance work practices

HPWP cover a wide range of workplace practices, including work flexibility and autonomy; teamwork and information sharing; training and development; and benefits, career progression and performance management (Fialho, Quintini and Vandeweyer, 2019^[23]). OECD research indicates that workers who are frequently exposed to HPWP receive more formal, non-formal and informal training than their counterparts who work in more traditional contexts. Moreover, when workplaces implement HPWP, the wage returns to non-formal and informal training are higher. For example, individuals who work in establishments that use HPWP can expect a 12% higher wage premium from engaging in non-formal training and a 9% higher wage premium from engaging in informal training than their counterparts who work in establishments where such practices are not widespread (Fialho, Quintini and Vandeweyer, 2019^[23]).

The positive and significant wage returns accruing to individuals participating in adult learning in workplaces characterised by strong adoption of HPWP suggest that good work practices enable workers to put their learning to effective use. Such employees have more flexibility and autonomy in their daily tasks, leading to more effective use of their skills and higher individual (wage) returns. Several countries have recently supported innovation at work and the adoption of HPWP to boost growth and productivity (Box 4.10).

Box 4.10. Initiatives supporting HPWP

- **High-Performance Working Initiative, New Zealand.** In its pursuit of workplace innovation, New Zealand has focused on improving productivity performance and has singled out the poor use of skills in workplaces as a key policy issue. The High-Performance Working Initiative helps SMEs streamline work practices and improve performance, while also increasing employee engagement and satisfaction. Business improvement consultants work with the firms to improve their productivity. The programme is funded in equal parts by the government agency Callaghan Innovation and the firm.
- **Australian examples of increasing innovation and productivity in firms.** In Australia, policy engagement with HPWP has been driven by a perceived need to increase innovation and productivity. Several Australian initiatives have sought to promote best practice in this area. Among the precursors was the Best Practice Demonstration Programme in the early 1990s. More recently, the Partners at Work Grants Programme in Victoria offers competitive grants to support workplace changes benefitting all stakeholders, including the development of co-operative workplace practices. The programme provides funding to support the hiring of consultants to work with organisations and relevant training investments.

Source: OECD/ILO (2017^[50]), *Better Use of Skills in the Workplace: Why It Matters for Productivity and Local Jobs*, <https://dx.doi.org/10.1787/9789264281394-en>; OECD (2019^[51]), *OECD Skills Strategy Poland: Assessment and Recommendations*, <https://dx.doi.org/10.1787/b377fbcc-en>.

Not only do HPWP produce immediate benefits for both firms and workers, they also offer potentially long-term benefits: when individuals work in firms that rely strongly on HPWP, they are generally more willing to invest/participate in further adult learning and skill development. The results presented in Figure 4.6 illustrate that on average across OECD countries, individuals working in firms characterised by widespread use of HPWP had lower odds of being disengaged from available adult learning opportunities than their counterparts employed in firms that did not rely on such practices.

Performance-based pay

Among the different options employers can use to stimulate engagement in adult learning is performance-based pay (i.e. bonuses). Such measures tie workers' productivity to their career progression and remuneration, by providing positive incentives for them to develop relevant skills that will increase their individual productivity and performance. The results in Figure 4.6 show that workers whose pay is linked to their performance are less likely to be disengaged from adult learning than workers whose pay is not linked to their performance. However, results from the Survey of Adult Skills (PIAAC) reveal widespread heterogeneity across countries in the relationship between performance-based pay increases and workers' motivation to participate in adult learning; the relationship is strongest in Poland and Slovenia, and weakest in Austria and the Czech Republic (see the supplementary online tables for Chapter 4 in Annex Table 4.A.1).

What are the challenges for motivated learners who are unable to meet their training goals?

Addressing the lack of willingness to participate in available learning opportunities is a key policy challenge for many countries. It requires policy interventions focusing on a diverse set of factors, including age, educational attainment, and the different characteristics of firms with different practices and incentive systems. More generally, it requires influencing the culture of learning among all adults. However, countries face two additional challenges to promoting adult learning:

- They must provide sufficient training opportunities to those who would like to receive more training.
- They must remove the barriers preventing those who are willing to participate in existing training, but have failed to do so.

On the one hand, data from the Survey of Adult Skills (PIAAC) indicate that across OECD countries, a significant share of individuals report they had participated in training, but would have engaged in more training given the choice. These individuals are *active learners seeking more training* and represent a considerable portion of the workforce (15% of workers on average across the OECD, and up to 24% of workers in New Zealand). Finding suitable ways to meet their learning goals and provide them with further training opportunities is a major challenge for countries, because it implies understanding and overcoming a range of barriers to participation specific to this group.

On the other hand, the Survey of Adult Skills (PIAAC) also shows that approximately 11% of workers in OECD countries reported they wanted to participate in training, but have not been able to do so. The *inactive but motivated* are a group of individuals whose challenge is not a lack of willingness to train, but rather a lack of access to training options. Many countries struggle to provide sufficient support to these individuals.

The prevalence of each one of these groups varies across countries. As shown in Figure 4.3, the share of active learners seeking more training is above the OECD average in New Zealand, the United States, Denmark and Singapore, where over 20% of those who have been able to access training reported wishing to participate in more learning to fulfil their goals. In Turkey, Greece and the Slovak Republic, on the other hand, only around 5% of individuals interviewed in the Survey of Adult Skills (PIAAC) reported a desire to receive more training.

Korea (18%) and Spain (16%) report the largest shares of *inactive but motivated* individuals (compared to 11% on average in OECD countries) who were unable to access learning opportunities despite their willingness to train, suggesting the existence of substantial barriers to accessing training for motivated individuals.

What are the individual characteristics defining those who are inactive but motivated, and active learners seeking more training?

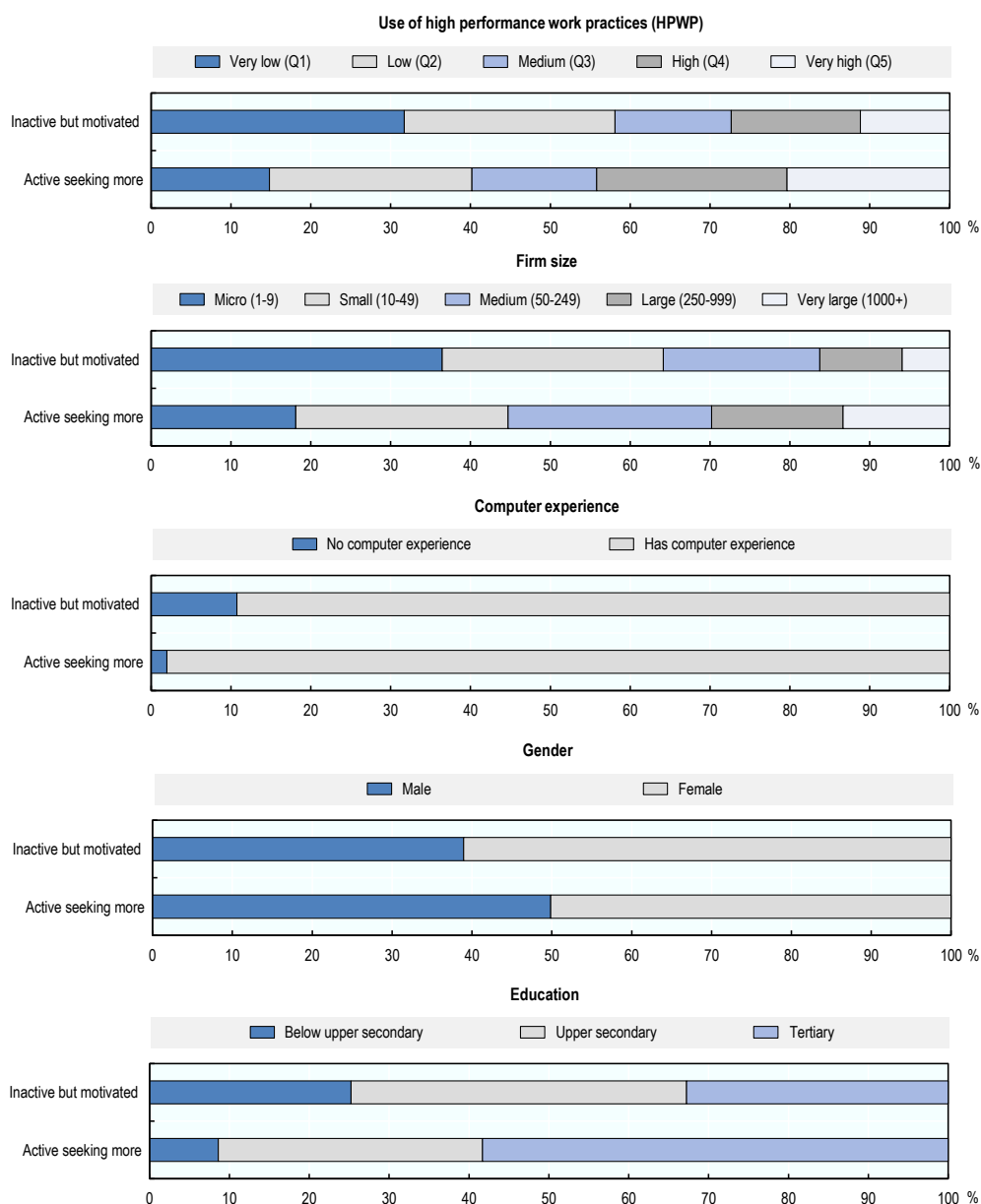
Both the *active seeking more* and the *inactive but motivated* learners share a common dissatisfaction concerning the ability of their country's training systems to fulfil their personal learning goals. However, the reasons for such dissatisfaction, and the type of policy intervention required to address those challenges; are radically different.

The results in Figure 4.7 indicate, for instance, that inactive but motivated individuals are more likely to be women, low-skilled workers or individuals lacking basic computer experience. These characteristics explain, at least in part, why these individuals were not able to access learning, despite their willingness to participate. As an example, while technological change is reshaping the way people live and work, the lack of basic digital skills is likely to hinder an individual's possibility of exploring the many new digital learning tools that are gaining popularity across countries. In fact, the results in Figure 4.7 show that on average across the OECD region, 11% of the inactive but motivated lack any computer experience or are low-skilled (25% attained at most a lower-secondary qualification). On average across the OECD, many also work in poor-quality jobs, and approximately 32% are employed in firms with very low HPWP. Expanding the provision of training opportunities to low-skilled individuals while helping to develop their basic digital skills are among the strategies countries could implement to engage them in adult learning.

By contrast, results in Figure 4.7 show that *active seeking more* individuals (i.e. those who have been to access some training, but reported a desire to engage in further training), are usually highly educated (comprising 58% of tertiary-educated individuals), equipped with basic digital skills (98% of them had previous computer experience) and employed in relatively larger companies relying on relatively higher use of HPWP.


Figure 4.7. The “inactive but motivated” often belong to the groups at risk of exclusion, while the “active seeking more” are more likely to be high-skilled individuals striving for additional training opportunities

Composition of the *inactive but motivated* and *active seeking more* groups, by individual, job and employer characteristics



Note: The x-axes indicate the shares of the *inactive but motivated* and *active seeking more* groups featuring specific characteristics. The use of HPWP is classified into quintiles by intensity use, where “very low” use relates to Q1, and “very high” to Q5.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Contextual barriers hinder otherwise motivated learners from achieving their learning goals

As detailed in the previous section, individual characteristics (such as age, skill level and digital competencies) can partly explain why motivated learners are not able to meet their learning goals. Contextual barriers (such as financial constraints, time and family obligations, or even lack of employer support) are also likely to affect individuals' ability to meet their learning goals. The importance and prevalence of these barriers, however, can differ vastly depending on whether individuals aspire to receive more learning (*active seeking more*) or would simply like to access training (*inactive but motivated*). Information contained in the Survey of Adult Skills (PIAAC) provides insights into the heterogeneous association between these barriers across individuals with different learning goals.

Data from the Survey of Adult Skills (PIAAC) allow classifying barriers to participation into seven main categories: lack of prerequisites, price-related constraints, lack of employer support, lack of time related to work, family obligations, inconvenient time or place, and barriers classified as “others”. The results in Figure 4.8 indicate that inactive but motivated individuals report family obligations and the cost of training as the most pressing barriers impeding their access to learning opportunities. The active seeking more group, on the other hand, often mention work-related time constraints, inconvenient time and place of the training, and the lack of employer support as barriers to participation in sufficient (further) training.

Figure 4.8. The “inactive but motivated” and “active learners seeking more training” report different contextual barriers to participation in adult learning

Percentage of the reported barriers to participation, by learner's profile, OECD countries



Note: The x-axes indicate the shares of the *inactive but motivated* and *active seeking more* group, reporting the given obstacle as the main barrier to participation.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

StatLink  <https://stat.link/mrk0ib>

Do family obligations hinder the access to training of otherwise motivated individuals?

Figure 4.8 indicates that 20% of *inactive but motivated* adults report family obligations as an obstacle to accessing adult learning, compared to only 12% of the active seeking more. Women, young adults (25-34 years old) and parents of dependent children are particularly likely to give up on participating in training for family reasons, and to end up being *inactive but motivated*. Family obligations disproportionately affect inactive but motivated women compared to men. Up to 28% of *inactive but motivated* women mention family obligations as a barrier to participating in training, compared to only 8% of men. In the case of parents with dependent children, the gender gap reaches 23% (27% for women vs. 4% for men). The results also show that family obligations are particularly important barriers for younger cohorts aged 25-34 years old. Policies aiming to boost (young) women's participation in training should lessen such constraints by providing support to individuals caring for elderly parents or dependent children (OECD, 2019^[8]).

The results in Table 4.1 suggest that a large share of motivated adult learners establish priorities between their family, work responsibilities and investments in further learning. Taking care of a family may raise distinct barriers to accessing learning, including limited flexibility (situational barrier) and the need for childcare (institutional barrier). As family obligations and task-switching interfere with the time available for independent study, they may prevent learners from developing adequate learning habits, diverting their attention from studying and decreasing the productivity of learning processes.

Table 4.1. Potential barriers to participation in adult learning

Barrier type	Definition
Situational	Result from the student's personal circumstances (e.g. employment or family responsibilities)
Dispositional	Founded on the student's beliefs, attitudes or values
Institutional	Dependent on the institutional setting

Source: Cross, K. (1981^[52]), *Adults as Learners. Increasing Participation and Facilitating Learning*.

Survey data for Ireland (Mooney and O'Rourke, 2017^[20]) find that regardless of whether female respondents were highly motivated to participate in training, childcare represented an overwhelming barrier to accessing learning opportunities. The study showed that the birth of a child reduced women's capacity to engage in full-time formal education. Access to cheap or free childcare is therefore key to enabling parents' participation in adult learning, and the lack of it seems to impact disproportionately young and motivated women's access to learning opportunities (see the supplementary online tables for Chapter 4 in Annex Table 4.A.1).

Relieving mothers of childcare obligations during training or independent study hours can help ensure the necessary mental space and energy to fully engage in learning. As such, providing good-quality and flexible childcare is essential, especially when adult training activities run outside of school hours and children are at home or with their parents. Childcare policies must be carefully designed so that both children and busy parents can meet their educational objectives. For instance, the loss of a free childcare subsidy when transitioning from full-time work to training inevitably discourages participation in adult learning (Pennacchia, Jones and Aldridge, 2018^[22]).

When parents do not work but are still constrained by family obligations, flexible training schedules, including part-time morning courses, can encourage them to participate on an "in-demand basis", rather than sticking to predefined and overly strict training schedules. Moreover, supporting learning environments that allow parents to bring their children along can help overcome challenges related to

family obligations, while enhancing the social and relational benefits of simultaneous participation by parents and children (Pennacchia, Jones and Aldridge, 2018^[22]).

Cost of training

The cost of training is reportedly one of the main barriers to participation in learning activities. Figure 4.8 shows that training costs are an especially important barrier not only for *inactive but motivated* learners, but also, to a lesser extent, for the active seeking more. The difference in the relevance of cost for the two groups is likely linked to the characteristics and employment status of those falling in the different categories: while *inactive but motivated* learners are predominantly low-skilled individuals with weak digital skills, the active seeking more are high-skilled, with a good command of digital competencies. This influences their relative employment status, as well as the available financial resources they can devote to training, with important effects on the methods policy makers may choose to target these individuals and support training supply. In fact, the results suggest that governments that put in place financial incentives to reduce the price of training should target them to training courses that reach *inactive but motivated* workers, who are mostly low-skilled and digitally illiterate.

Additional analyses based on data from the Survey of Adult Skills (PIAAC) confirm that unemployed workers' participation in adult learning is particularly affected by financial constraints, which generally impede access to training altogether, even for individuals who might be motivated to learn. Nearly one-third (31%) of the unemployed mention the cost of training as an obstacle to adult learning, compared to 18% of employed individuals belonging to the category of *inactive but motivated* learners.⁷

Being low-skilled, unemployed or in a low-quality job can create a vicious circle where workers find themselves trapped with an insufficient skill set to improve their labour-market prospects, while also being unable to fund the additional adult learning needed to move forward. Different countries have put in place several initiatives to help individuals participate in learning and improve their labour-market outcomes (Box 4.11).

As the COVID-19 health and economic crisis continues to put pressure on government budgets, finding the right way to support learning programmes and fund training activities remains a challenge. Adult learning should be financed equitably by the stakeholders expected to benefit from it, including through skill-funding pacts between governments, employers and individuals. Different support mechanisms, targeting both companies and individual citizens, are already in place in OECD countries (see also Box 4.11). These include targeted financial support, through grants, loans, subsidies or employer support to partially relieve the financial burden of training provision. Social partners can also get involved, further sharing the burden of spending among firms and workers (OECD, 2019^[4]).

Education and labour-market policies should also work together to propose solutions supporting learners. In addition to providing grants or subsidies that reduce training fees, labour-market policy should ensure that prospective learners who receive allowances or benefits (e.g. a jobseeker's allowance) can retain them as they pursue training. A lack of clear guidance, or inconsistent social welfare benefits, may place participants in a precarious position, completely precluding enrolment in training (Mooney and O'Rourke, 2017^[20]).

Box 4.11. Initiative for Adult Education (*Initiative Erwachsenenbildung*)

In 2012, Austria introduced a co-ordinated programme to help adults obtain basic competencies and basic educational qualifications free of charge.

The initiative aims to enable as many people as possible to gain basic skills and/or obtain a lower-secondary degree (*Pflichtschule*), to empower them to participate in social, cultural, technological and economic development. The programme has two strands: i) basic skill courses (conveying at least three competencies, among German, mathematics, digital skills, language/English and learning skills) and covering 100 to 400 teaching hours; and ii) second-chance education courses, leading to the lower-secondary certificate (*Hauptschulabschluss*) and covering 1 160 teaching hours.

Reception

According to the evaluation of the first programming period, 83% of participants were satisfied with the training offer; 93% stated they had reached their goals and their expectations had been fulfilled (Stoppacher and Edler, 2014^[53]). The interviewed stakeholders consider the programme as a “leap forward” and an improvement on the existing offer, although many criticise the programme’s low coverage compared to the actual need of the population.

Effectiveness

Evaluations of the two first programming periods show that the measure has exceeded its quantitative targets (Stoppacher and Edler, 2014^[53]); (Steiner, 2017^[54]). The 2017 evaluation found that: i) dropout rates were around 22% for both programme strands; and ii) transitions to further education or employment were difficult for older individuals and asylum seekers, and easier for employed people (based on qualitative evidence) (Steiner, 2017^[54]).

Success factors

- co-operation between the federation and federal states in development and implementation
- early involvement of all stakeholders in the design of measure
- use of thorough needs assessment before designing the measure.

Source: OECD (2020^[17]), *Increasing adult learning Participation: Learning from Successful Reforms*, <https://dx.doi.org/10.1787/cf5d9c21-en>; Steiner, M (2017^[54]), *Evaluation der Initiative Erwachsenenbildung*; Stoppacher, P. and M. Edler (2014^[53]), *Evaluation der ersten Periode der Initiative Erwachsenenbildung*.

Lack of prerequisites can limit access to training of otherwise motivated individuals

Regulatory barriers may discourage or impede learners who would like to participate in adult learning. “Lack of prerequisites” is reported as an important barrier preventing twice as many *inactive but motivated learners* from participating than *active seeking more* individuals (Figure 4.9).

In many cases, the lack of prerequisites is more of a “formal” barrier than a real one, as it relates more to the absence of recognition of prior learning (or informal learning) than to the actual absence of minimum prerequisites for learners who would like to participate in training. Many countries across the OECD region have developed recognition of prior learning (RPL) systems, which are essential to ensure that low-qualified but motivated adults can be engaged in training. Nevertheless, the quality and effectiveness of

RPL varies considerably across and within countries, creating additional barriers to participation in training of many motivated individuals, especially the low-skilled.

Some countries have already taken measures to address this issue by improving existing validation of prior learning. France, for instance, has made the system for the recognition and certification of skills (*validation des acquis de l'expérience*) more accessible to low-qualified individuals. Firms are obligated to inform their workers about the certification system every other year as part their mandated professional development assessment (Mathou, 2016^[55]).

In Portugal, Qualifica Centres target low-qualified adults (among other groups) and have embedded RPL in their overall guidance offer. A key characteristic of the programme is that low-qualified individuals receive assistance throughout the skill-recognition procedures. In 2017, 28 804 adults enrolled in recognition procedures, and 10 157 received a certificate (OECD, 2019^[12]).

All in all, prior analysis shows that policy makers should aim to make RPL easy to navigate for the low-qualified and avoid complex procedures to facilitate take-up. In parallel, and to the extent possible, training providers should avoid setting excessively high eligibility requirements and create homogeneous classrooms where individuals with basic skills can feel comfortable with expressing their learning needs. Placing participants with low literacy, numeracy and computer skills in an excessively complex learning environment may result in dropout or non-achievement, especially when they feel inadequate relative to the level of the classroom (Mooney and O'Rourke, 2017^[20]). A study in the United Kingdom found that widely embedding literacy and numeracy skills in the training curriculum increased retention and success rates, with many learners acquiring such foundation-level skills in addition to the vocational skills taught by the course (Casey et al., 2007^[56]).

Work-related and time constraints affect motivated individuals' ability to fully reach learning goals

A busy work schedule is the most important barrier to participation for both the *active seeking more* group (38%) and the *inactive but motivated* (21%). Full-time employment, especially for ambitious individuals who often work overtime and in competitive professional environments, does not always leave enough space for other commitments, including education.

New and more flexible approaches to learning, such as modular or online training, can alleviate work pressures in situations where adults are unable to combine stressful work schedules with their desire to participate in training. Modular training, which divides a learning programme into self-contained and certified modules, allows learners to learn on their own schedule (Box 4.12).

Box 4.12. Modular training to accommodate time constraints

- In Denmark, learners can combine modules from different types of adult learning programmes (e.g. advanced management and leadership programmes; basic skills courses; higher education, vocational education and training; and non-formal liberal education programmes) to obtain a formal qualification (OECD, 2019^[2]).
- In Flanders (Belgium), Centres for Adult Education (*Centra voor Volwassenonderwijs*) provide education in a wide range of skills, including technical skills and languages. The courses are fully modular: the learner receives a partial certificate after completing a module and a formal certificate recognised by the Flemish Government after completing an entire programme (OECD, 2019^[57]).
- In Mexico, the Education Model for Life and Work allows low-skilled adults to gain qualifications through different modules at the initial, intermediate (primary education) and advanced (lower-secondary education) levels (OECD, 2019^[12]).

Source: OECD (2019^[4]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

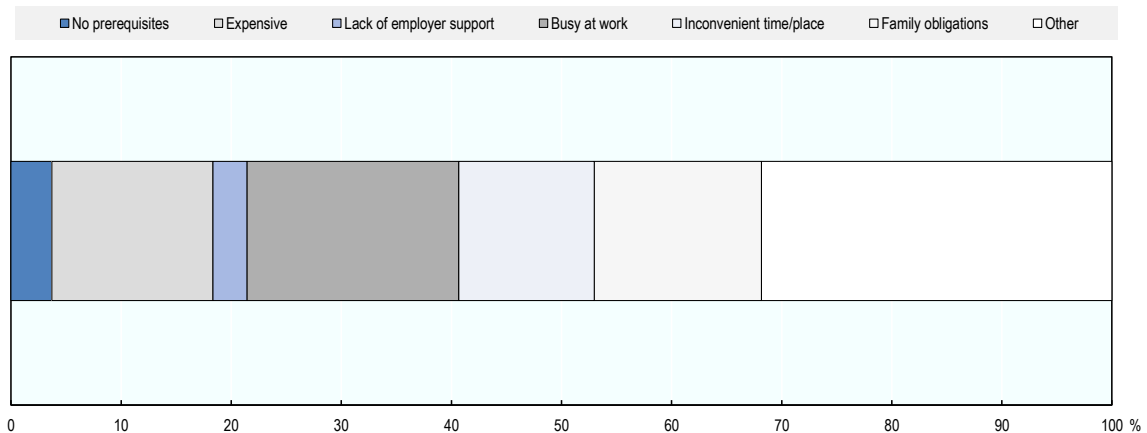
Innovation and digitalisation have allowed diversifying the training offer, expanding access channels and reaching new learners across the world. However, digital learning poses several challenges. A key concern is the need to validate virtual, remote or digital training, clearly signalling to potential employers the nature of the skills acquired by means of a certificate or credential. So-called “alternative credentials”, such as digital badges, micro-credentials and professional or industrial certificates, are an increasingly important part of the adult learning landscape, but are not sufficiently widespread or widely recognised by employers. Governments, in collaboration with public and private training providers, need to strengthen the take-up and quality of digital qualifications through appropriate certification, quality assurance, and monitoring and evaluation of training outcomes.

Other barriers to participation in adult learning and ways to support older individuals engage in learning

Earlier OECD research (e.g. (OECD, 2019^[2])) based on data from the Survey of Adult Skills (PIAAC) has focused on the role played by explicit barriers such as financial and time constraints or family obligations, placing far less emphasis on analysing “other” barriers hindering participation in training. Yet learners often cite “other” barriers as important obstacles to training.

Results from the Survey of Adult Skills (PIAAC) show that older workers (55-65 years old) in particular are significantly constrained by barriers “other” than those mentioned in the six main categories analysed so far. For instance, 32% of *inactive but motivated* individuals in that age range cite “others” as the main barrier to participation, comprising the highest share of responses across the different options given to respondents (Figure 4.9).⁸

Figure 4.9. Percentage of the reported barriers to participation among *inactive but motivated* adults aged 55-65, OECD countries



Note: The figure indicates the share of inactive but motivated adults aged 55-65 reporting a given obstacle as the main barrier to participation.
Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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While it is difficult to pinpoint the exact aspects falling under the “other barriers” category, lack of guidance and advice, a poor training offer, motivational barriers and social norms are among factors previous literature has highlighted as inhibiting participation in training.

First, while individuals may in principle be willing to participate in training, some may lack information on ways to get involved, the most relevant opportunities and the potential outcomes in terms of career development. Well-designed information, advice and guidance services can provide prospective students with information that is easy to navigate, timely and relevant to their needs, including financial advice. Help in identifying skills gaps, and directing learners towards the most suitable training opportunities, can make training more accessible and boost take-up (OECD, 2019^[4]; Pennacchia, Jones and Aldridge, 2018^[22]).

Second, the lack of an adequate and tailored learning offer can represent a significant barrier, especially for older workers who may have low basic skills or struggle to adopt new digital technologies. Previous literature has stressed the importance of delivering training aligned with participants’ personal dispositions. In some cases, the lack of a well-defined course structure, such as imposed deadlines, may demotivate learners from following and completing the training. Similarly, incorrectly matching learners to overly challenging courses may undermine their self-confidence and interest in further training.

Third, previous results presented in this chapter highlighted how motivation to learn is one of the strongest predictors of willingness to train. Individuals build such motivation early in life and school by developing positive attitudes towards learning: notably, it has been shown that prior schooling records do shape learners’ self-esteem and confidence in their learning abilities. Thus, adults who struggled at earlier stages of their education may lack self-confidence or associate learning with negative experiences they do not want to replicate in adulthood. Similarly, a return to training may seem daunting after a long break from learning (e.g. in the case of older workers) or detachment from the labour market (e.g. among the long-term unemployed or women returning to work after an extended maternity leave). Ireland’s national adult learning organisation, AONTAS, has found that many of these learners will succeed in adult education provided they have positive initial experiences, often derived from low-pressure, non-accredited courses that help them acquire soft skills and build confidence (AONTAS, 2013^[19]).

Fourth, peers or family may create negative expectations about learning that may discourage the drive to learn later in life. Social norms – and the manner in which people who “go back to school” are perceived – can also discourage older workers from engaging in further training: a study conducted in Korea showed that although 75% of senior citizens did not receive the level of education they desired, it became more difficult for them to receive further education later in life because of socially conservative cultures, family dissuasion from their children or other family members and social attitudes.

In parallel, older adults may lose interest in training if it does not lead to significant gains in the labour market – which is unfortunately often the case, as employers offer little support to older workers seeking training. However, several countries are putting considerable resources into supporting firms that supply training programmes for older workers (Box 4.13).

Box 4.13. Encouraging employers to train older workers

- In Germany, the public employment agency supports training of low-skilled and older workers in SMEs through the WeGebAU programme. SMEs receive a 75% subsidy to cover the training costs of workers aged 45 and older, while micro enterprises with fewer than 10 employees receive a 100% subsidy. Evaluations of the programme have found that it helps participants increase their time spent in employment, although it has no effect on wages and the probability of future financial benefits (Dauth, 2017^[58]; OECD, 2019^[2]).
- In Luxembourg, private-sector companies can receive training aid totalling up to 15% of the yearly amount invested in training; 35% of salaries of trained employees are paid by subsidies for certain workers, including those aged over 45 (Luxembourg Government, 2019^[59]).
- In Slovenia, the Comprehensive Support for Companies for Active Ageing of Employees Programme provides financial incentives for employers to prepare action plans and strategies to ensure better management of older (over 45) workers, as well as financial incentives for upskilling of older (over 45) workers. Capacity-building workshops are organised to build the competencies of human resource managers and CEOs in managing an ageing workforce (OECD, 2017^[60]).

Source: OECD (2019^[4]), *OECD Employment Outlook 2019: The Future of Work*, <https://dx.doi.org/10.1787/9ee00155-en>.

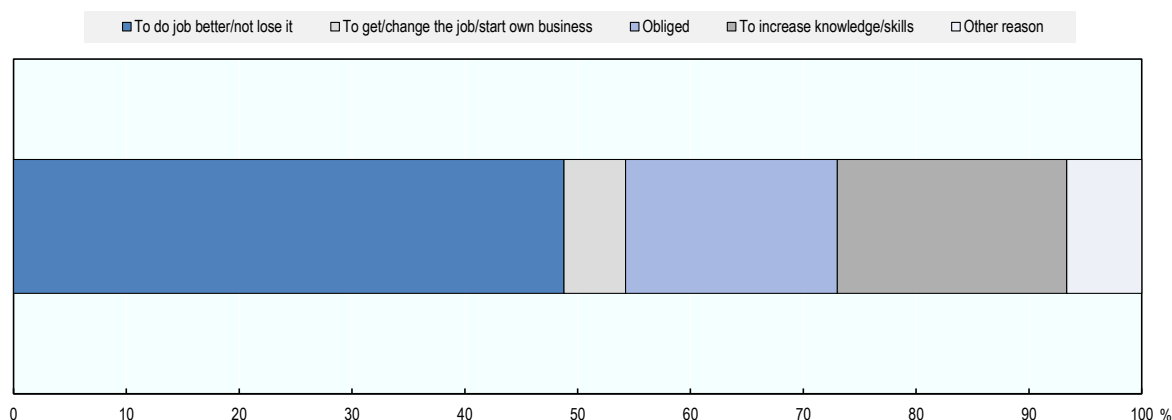
What are the drivers of participation in training for satisfied learners?

The results presented in previous sections have discussed the challenges related to the lack of motivation to train, as well as the barriers to participation of otherwise motivated learners who are not able to fulfil their learning goals. A significant share of individuals, however, does participate in training and reports being satisfied with the quantity of training received. Information contained in the Survey of Adult Skills (PIAAC) allows investigating these *satisfied learners*’ motives for participating in training, shedding light on how firms can better align the training offer to recipients’ desires.

Data from the Survey of Adult Skills (PIAAC) (Figure 4.10) show that almost 50% of the *satisfied learners* participate in training to excel in their job. The data also reveal that “doing one’s job better” is particularly important for adults with higher educational attainment, as well as younger cohorts entering the labour market and those at the beginning of their career (25-34 year-olds); the importance of this reason seems to decrease with age. Creating a strong alignment between training content and the changing needs of the labour market is therefore key to engaging learners and fulfilling their learning goals, especially when they are at the beginning of their adult work life.

It is also notable that 20% of the *satisfied learners* interviewed reported having participated simply to increase their knowledge and skills. Thus, many individuals seek learning opportunities they can apply to a variety of activities other than their daily job tasks. This suggests that educated adults with good employment conditions are more prone to learn for self-improvement. Engaging individuals not only in technical and narrow training, but also in more horizontal and holistic learning activities, can therefore spur successful engagement in learning throughout their lives.

Figure 4.10. Half of satisfied learners participate in adult learning to excel in their jobs



Note: The figure indicates the shares of *active and satisfied* adults who indicated the respective motivations as the main reason for participating in adult learning. “To do job better/not lose it” captures respondents who indicated “to do my job better and/or improve career prospects” or “to be less likely to lose my job” as the main reason for participation. “To get/change the job/start own business” captures respondents who indicated “to increase my possibilities of getting a job, or changing jobs or profession” or “to start my own business” as the main reason for participation. “Obligated” refers to the respondents who answered: “I was obliged to participate”. “To increase knowledge/skills” captures respondents who indicated “to increase my knowledge or skills on a subject that interests me” as the main reason for participation. “Other reason” captures respondents who indicated “to obtain a certificate” or “other reason” as the main reason for participation.

Source: OECD (2019^[8]), Survey of Adult Skills (PIAAC) (database 2012, 2015, 2019), <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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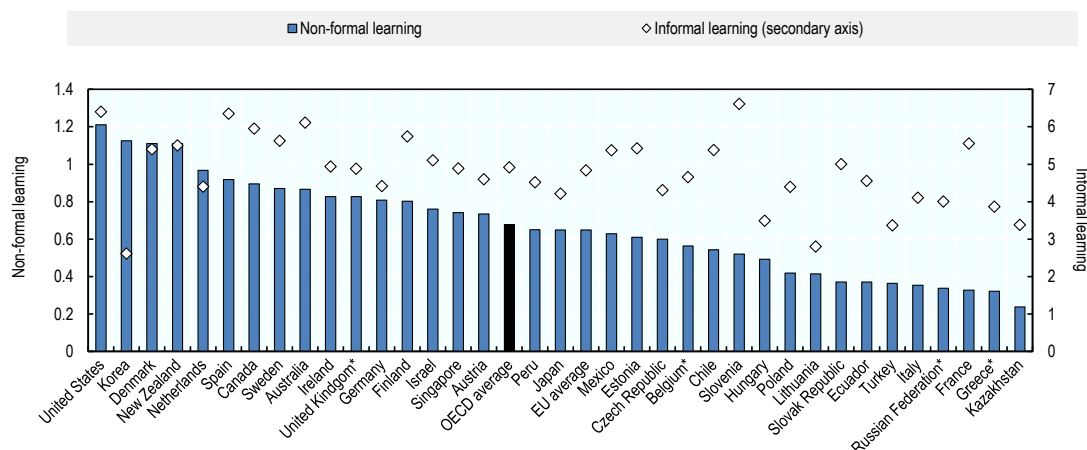
Learning losses and COVID-19: The effects of COVID-19-induced shutdowns on workers' participation in adult learning

Because of COVID-19, many employers have been unable to provide physical learning opportunities in the workplace, thus reducing participation in learning and potentially leading many workers to disengage from future learning. Although some workers have been able to exploit technology to pursue learning opportunities through digital platforms, many forms of learning (especially informal learning) have been lost owing to physical distancing and workplace closures.

As Figure 4.11 shows, informal learning was at least twice as common as non-formal learning before the pandemic, even under the most conservative assumptions. Differences in the number of hours spent in non-formal and informal learning were significant across countries.

Figure 4.11. Hours of non-formal and informal learning, by country

Average weekly hours of non-formal and informal learning, per worker



Note: The figure makes a cross-country comparison on the average weekly learning hours of non-formal and informal learning per worker.

*For Belgium, Greece, the Russian Federation and the United Kingdom, see notes under Figure 4.1.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>.

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Impact of the pandemic on individual sectors

While the COVID-19 pandemic forced virtually all businesses to rethink their operations, some sectors have been more exposed than others to shutdowns of non-essential activities. Workers in the tourism and recreation sector, including those employed in civil aviation, have been particularly hard hit by economic shutdowns. Other workers, particularly in essential services such as health care, have been mobilised to assist citizens and businesses. For them, operations never ceased. The intensity of sectoral shutdowns, and the ability of firms to transfer operations on line, have been two key determinants of workers' ability to access learning provision.

Measuring precisely the intensity of sectoral shutdowns in each country, and the subsequent share of workers who have been forced to remain home, is difficult. The analyses that follow develop two distinct scenarios – a *widespread* and a *limited* sectoral shutdown – that could be used to assess the average lost hours of non-formal and informal learning workers in different sectors experienced during the pandemic. The two scenarios can be interpreted as “extremes” in terms of the pathways countries could find themselves in, depending on the restrictions in place. As the pandemic unfolded, countries have been moving across the scenarios, and may have found themselves at any point between the two scenarios.

The *widespread* scenario was developed using the assumptions developed for the OECD *Economic Outlook 2020* (OECD, 2020^[61]) to assess the gross domestic product effects of sectoral shutdowns in seven heavily-hit sectors (Table 4.2). To improve sectoral coverage, the analysis added figures on three further sectors (MISE, 2020^[62]). The *limited* scenario accounts for a partial easing of restrictions, assuming a progressive uptake in activity in countries where improvements in the pandemic conditions permit it. The shutdown rates were then recalculated using the index of “essentiality” of individual sectors (at the International Standard Industrial Classification of All Economic Activities [ISIC] 2-digit level [divisions], as estimated in Fana et al. (2020^[63])), following the assumption that once countries can lift some of the restrictions, they begin with the most essential activities.⁹ This implies that divisions classified as most

essential (index=1) move into a 0% shutdown, and the least essential divisions (index=0) remain at the level of shutdown previously estimated under the *widespread* scenario. Table 4.2 summarises the *limited* scenario shutdown rates, recalculated at the 1-digit sectoral level.

While these figures illustrate the decrease in economic activity across the OECD, they do not allow drawing up distinct scenarios for individual countries. This simplification is necessary to avoid the abundance of constantly evolving scenarios as the pandemic unfolds, but must be considered when analysing cross-country results. In the case of the sectoral estimates drawn from the MISE analysis, the extrapolation takes the opposite direction, from country-specific to generalised results; this must also be considered when interpreting the final results. Sectors that are not mentioned explicitly in Table 4.2 are assumed to be operational, although they may still be somewhat affected in many countries. As such, the aggregates of foregone learning hours should be interpreted as lower bound estimates.

Table 4.2. Sectoral shutdown (%)

Sector (ISIC, 1-digit)	Assumed percentage of the activity shutdown	
	<i>Widespread</i> scenario	<i>Limited</i> scenario
Mining and quarrying (VB)	100%	63%
Manufacturing (VC)	50%	35%
Construction (VF)	50%	47%
Wholesale and retail trade (VG)	75%	35%
Accommodation and food services (VI)	75%	75%
Real estate services (VL)	40%	40%
Professional service activities (VM)	50%	29%
Administrative and support service activities (VN)	100%	64%
Arts, entertainment and recreation (VR)	100%	100%
Other service activities (VS)	100%	86%

Note: The two scenarios can be interpreted as the “extremes” in terms of the pathways that countries can follow, depending on the current restrictions in place. As such, countries whose sanitary conditions allow for a progressive activity relief according to the sectors “essentiality” can assume to follow the *limited* scenario path, while a hard lockdown corresponds the *widespread* scenario path. Throughout the pandemic, countries can move across the scenarios, and find themselves at any point in-between the two scenario pathways. The sectoral data are on an ISIC rev. 4 basis in all countries. The calculations are based on an assumption of an economy-wide shutdown, rather than a shutdown confined to particular regions only.

1. The seven sectors covered by OECD (2020_[61]) include: Construction (VF), Wholesale and retail trade (VG), Accommodation and food services (VI), Real estate services (VL), Professional service activities (VM), Arts, entertainment and recreation (VR), and Other service activities (VS).

2. Three additional sectors included basing on (MISE, 2020_[62]) are: Mining and quarrying (VB), Manufacturing (VC), and Administrative and support service activities (VN).

3. Fana et al. (2020_[63]) analyse the restrictions on activities imposed in Italy, Spain and Germany. Basing on the national confinement decrees, the authors classify all economic sectors in a scale of “essentiality”. Across the countries, sectors classified as fully essential cover food and pharmaceutical production, utilities, transport and health (index=1). In the other extreme, the sectors considered non-essential (e.g. leisure, hotel and restaurant activities), are assigned the index of 0. Intermediate activities are assigned the index ranging from 0 to 1, basing on the degree to which they are required to satisfy the fundamental needs.

4. Sectors that are assumed to be operational include Agriculture, forestry and fishing (VA), Electricity, gas, steam and air conditioning supply (VD), Water supply; sewerage, waste management and remediation (VE), Transportation and storage (VH), Information and communication (VJ), Financial and insurance activities (VK), Public administration and defence; compulsory social security (VO), Education (VP), Human health and social work activities (VQ), Activities of households as employers; undifferentiated goods- and services- producing activities of households for own use (VT).

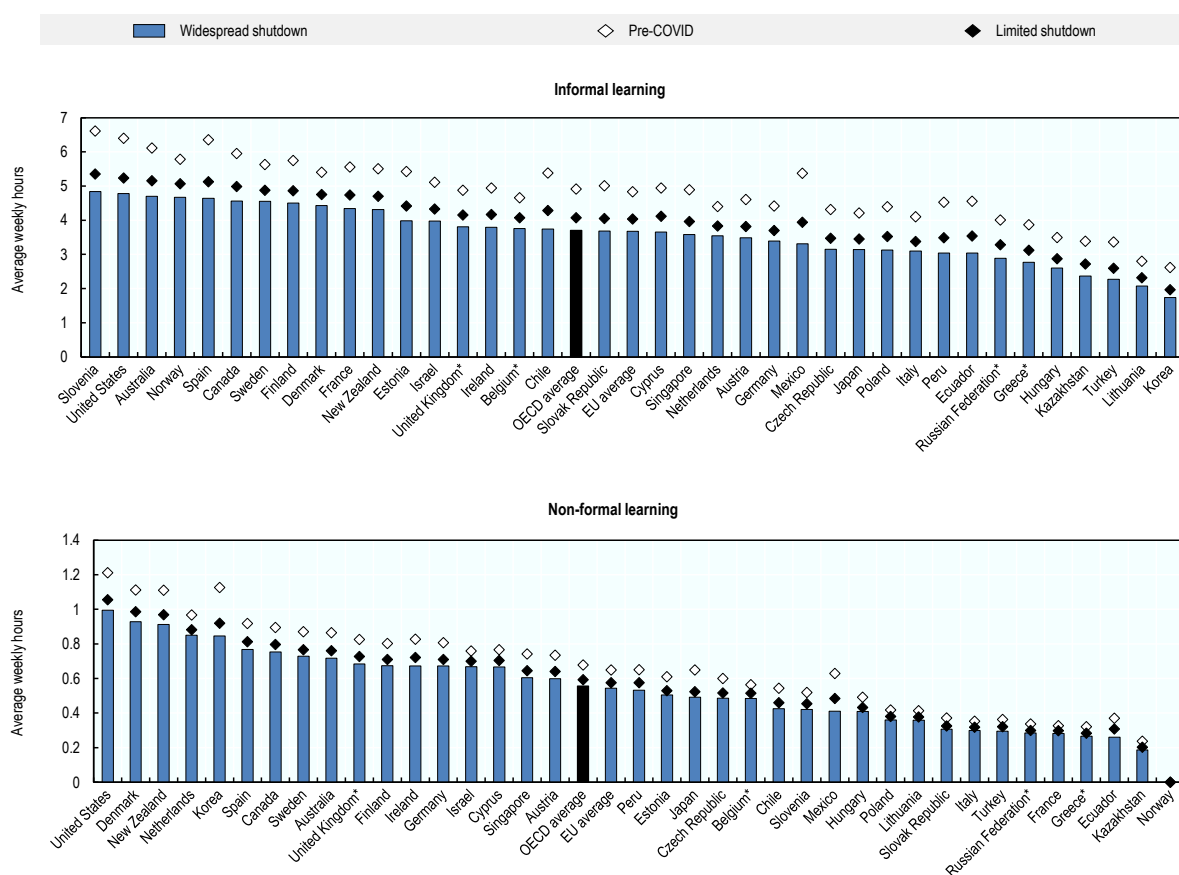
Source: OECD (2020_[61]) *OECD Economic Outlook, Volume 2020 Issue 1*, <https://doi.org/10.1787/0d1d1e2e-en>; OECD calculations based on MISE (2020_[62]), Ministero delle Infrastrutture e Sviluppo Economico, Decreto ministeriale 25 marzo 2020 – Nuovo Coronavirus. Modifiche al DPCM 22 marzo 2020, and on Fana, M. et al. (2020_[63]), *The COVID confinement measures and EU labour markets COVID & Empl Working Group*, <http://dx.doi.org/10.2760/079230>.

The impact of COVID-19-induced shutdowns on workers' ability to train

The results illustrated in Figure 4.12 show that across OECD countries, workers' learning opportunities during widespread shutdowns could have decreased by an average of 18% in the case of non-formal learning and 25% in the case of the informal learning. These estimates take into account the partial transfer of learning activities on line, according to the country and sectoral feasibility of remote working discussed above.¹⁰ Figure 4.12 provides a cross-country overview of the estimated impact of COVID-19-related reductions in economic activities on the number of informal and non-formal learning hours undertaken by an average worker, for each week of restrictions. The emerging cross-country differences reflect the differences in workers' average participation in learning activities in each country, as well as differences in each country's economic structure. For example, economies that are more dependent on sectors which rely on face-to-face physical presence are likely to experience greater losses in learning hours.

Figure 4.12. Estimated impact of COVID-19-related reductions in economic activity on workers' ability to learn, by country

Average weekly hours of learning per worker, pre-COVID and following the two shutdown scenarios



Note: Learning hours under the shutdown scenarios account for the feasibility of working remotely at the country level. Countries are sorted in descending order of learning hours under the widespread shutdown scenario.

*For Belgium, Greece, the Russian Federation and the United Kingdom, see notes under Figure 4.1.

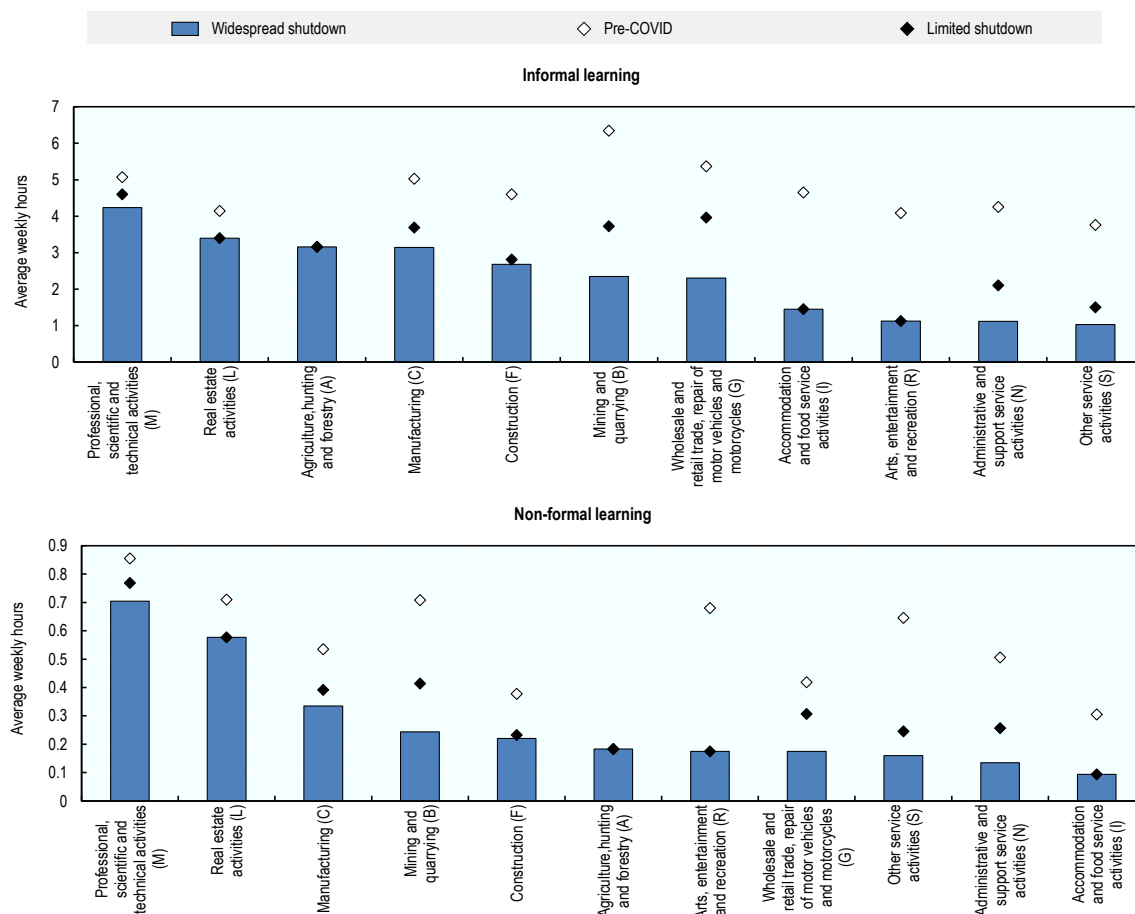
Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>; OECD (2020^[61]) *OECD Economic Outlook, Volume 2020 Issue 1*, <https://doi.org/10.1787/0d1d1e2e-en>; Fana, M. et al. (2020^[63]), *The COVID confinement measures and EU labour markets*, <http://dx.doi.org/10.2760/079230>; and Espinoza, R. and L. Reznikova (2020^[64]), "Who can log in? The importance of skills for the feasibility of teleworking arrangements across OECD countries", <https://dx.doi.org/10.1787/3f115a10-en>.

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The sectoral analyses presented in Figure 4.13 indicate that under the widespread shutdown scenario, reductions in economic activities have had the strongest negative impact on informal and non-formal learning opportunities for workers employed in administrative and support service activities (N); arts, entertainment and recreation (R); and other service activities (S). On average, workers employed in these sectors lose nearly three-quarters of informal and non-formal learning opportunities compared to the pre-pandemic scenario. When the epidemiological situation improves and more economic activities begin to operate at higher levels in the limited shutdown scenario, the arts, entertainment and recreation (R) sector remains the most affected (since these activities are classified as strictly non-essential). As with the cross-country results, sectoral differences reflect variations in learning hours under a “business-as-usual” scenario, combined with the extent to which each given sector has been forced to suspend its operations (under the widespread shutdown scenario) and the sectoral “essentiality” index determining the limited shutdown scenario.

Figure 4.13. Impact of COVID-19-related reductions in economic activities on the number of learning hours, by sector

Average weekly hours of learning per worker, pre-COVID and following the two shutdown scenarios



Note: Learning hours under the shutdown scenarios take into account the feasibility of working remotely at the sectoral level. Sectors are sorted in descending order of learning hours under the widespread shutdown scenario.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>. OECD (2020^[61]) *OECD Economic Outlook, Volume 2020 Issue 1*, <https://doi.org/10.1787/0d1d1e2e-en>.

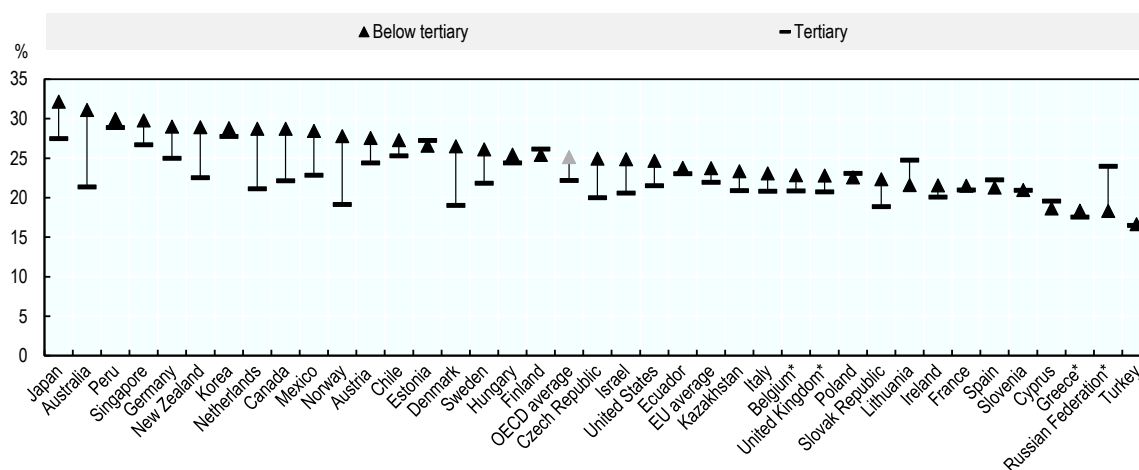
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Low-skilled workers suffer the most when learning opportunities are reduced owing to economic shutdowns

Low-skilled workers tend to be overrepresented in sectors that have been hardest hit by pandemic-induced closures and had fewer opportunities to transition to digital work and remote delivery. On average across the OECD, 25% of workers without tertiary education would be affected under a widespread shutdown scenario (Figure 4.14) compared to around 22% of tertiary-educated workers, a difference of 3 percentage points. In Australia and Norway, however, the differences between tertiary-educated and non-tertiary-educated workers affected under such a scenario amount to at least 10 percentage points.

Figure 4.14. Probability of being affected by the sectoral shutdown during widespread lockdowns, by country and educational attainment


Share of workers whose economic activity has been shut down owing to COVID-19-related measures



Note: Workers affected by the shutdown are employed in sectors assumed to be partly or fully subject to the shutdown under the widespread shutdown scenario. In a sector whose activity has been cut by half, 50% of workers are affected by the shutdown. These calculations do not take into account the possibility of working remotely. Countries are sorted in descending order of the share of below-tertiary-educated workers whose economic activity has been shut down owing to COVID-19-related measures.

*For Belgium, Greece, the Russian Federation and the United Kingdom, see notes under Figure 4.1.

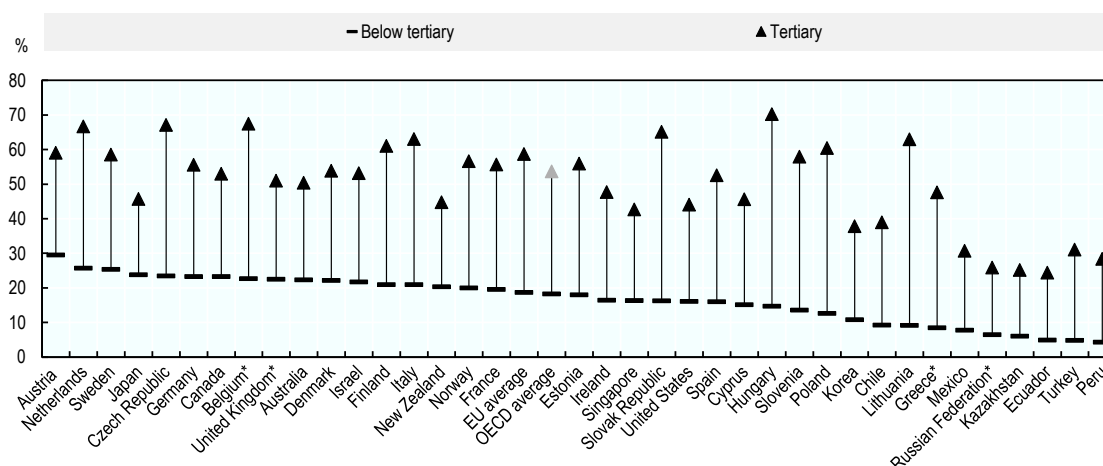
Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>; OECD (2020^[61]) *OECD Economic Outlook, Volume 2020 Issue 1*, <https://doi.org/10.1787/0d1d1e2e-en>.

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Deepening inequalities could also stem from the lack of opportunities for different workers to work remotely. Figure 4.15 suggests that low-skilled workers are more often engaged in service jobs that require physical presence: on average, 54% of tertiary-educated workers were able to work from home, compared to only 18% of workers without a tertiary degree (Espinoza and Reznikova, 2020^[64]).

Figure 4.15. Feasibility of working remotely

Percentage of workers whose jobs are compatible with working remotely, by country and educational attainment



Note: Countries are sorted in descending order of the feasibility of working remotely for below-tertiary-educated workers.

*For Belgium, Greece, the Russian Federation and the United Kingdom, see notes under Figure 4.1.

Source: OECD (2012^[6]), (2015^[7]), (2019^[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>; Espinoza, R. and L. Reznikova (2020^[64]), "Who can log in? The importance of skills for the feasibility of teleworking arrangements across OECD countries", <https://dx.doi.org/10.1787/3f115a10-en>.

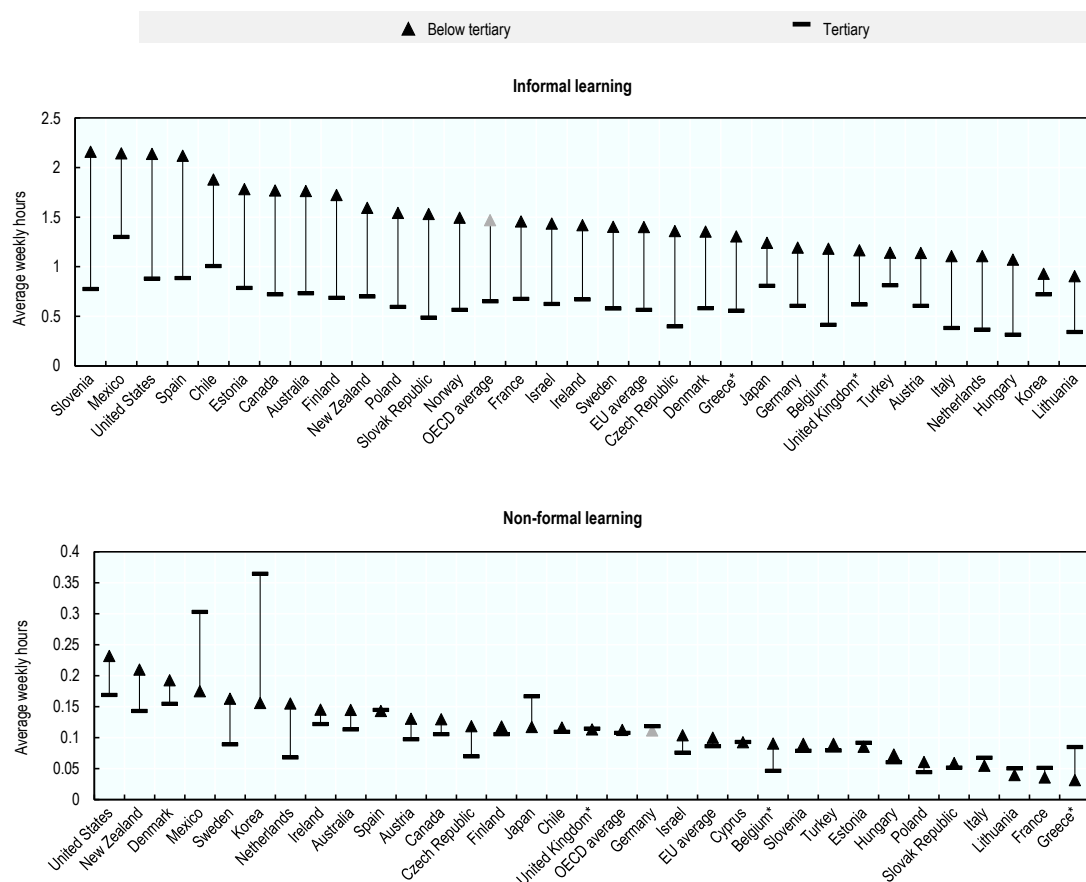
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Taken together, these two effects had led to varying "learning loss" outcomes depending on workers' educational attainment. Estimates indicate that on average, medium- and low-skilled workers may have experienced twice the reduction in informal learning opportunities than tertiary-educated adults. Under the widespread shutdown scenario, an average tertiary-educated worker is estimated to have missed just over 30 minutes of informal learning every week, while a worker with at most an upper-secondary education is estimated to have missed nearly 1.5 hours (Figure 4.16). Disparities vary across countries and are particularly pronounced in Slovenia, the Slovak Republic, Spain and the United States.

Workers who did not attain tertiary education are also more likely to miss non-formal learning opportunities. In the Netherlands, the gap is widest both in absolute and relative terms, as the impact on low- and medium-qualified workers is 2.3 times larger than for the tertiary-educated group. In Korea and Mexico, tertiary-educated workers missed a significantly larger amount of informal learning opportunities than the lower-educated workers. Figure 4.16 details specific cross-country differences.

Figure 4.16. Average weekly impact on the number of learning hours during widespread shutdowns

Weekly hours of learning foregone. Average per worker, by country and educational attainment



Note: The impact takes into account both specific sectoral shutdowns, as in OECD (2020_[61]) (widespread shutdown scenario), and the feasibility of working remotely at the sectoral level.

*For Belgium, Greece and the United Kingdom, see notes under Figure 4.1.

Source: OECD (2012_[6]), (2015_[7]), (2019_[8]), *Survey of Adult Skills (PIAAC) databases*, <http://www.oecd.org/skills/piaac/publicdataandanalysis/>; OECD (2020_[61]) *OECD Economic Outlook, Volume 2020 Issue 1*, <https://dx.doi.org/10.1787/3f115a10-enhttps://doi.org/10.1787/16097408>; and Espinoza, R. and L. Reznikova (2020_[64]), "Who can log in? The importance of skills for the feasibility of teleworking arrangements across OECD countries", <https://dx.doi.org/10.1787/3f115a10-en>.

StatLink  <https://stat.link/uq5f11>

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Annex 4.A. Supplementary tables

Annex Table 4.A.1. List of online tables for Chapter 4

Table number	Table Title
Table 4.1	Country specific results for regressions estimating disengagement
Table 4.2	Pooled result for regressions estimating disengagement

StatLink  <https://stat.link/fzn9i0>

Notes

¹ The analysis of the *disengaged* group focuses on adults in employment, so as to be able to capture the impact of both individual and job/employer characteristics on adults' willingness to train.

² The drive to learn index aggregates self-reports on how strongly they agree or disagree (5 point Likert scale, ranging from strongly disagree to strongly agree) with the following statements: "I like to learn new things", "I like to get to the bottom of difficult things" and "If I don't understand something, I look for additional information to make it clearer". The index is then rescaled to take values between 0 and 1.

³ An "atypical" contract refers to a non-indefinite contract (i.e. a fixed term, temporary, apprenticeship or training scheme contract).

⁴ Similarly, by anchoring wages to productivity, employers will have more incentives to attract the right type of skills for their vacancies (OECD, 2017^[24]).

⁵ Results for individuals with over ten years of tenure are generally not statistically significant.

⁶ The European Continuing Vocational Training Survey does not include data on micro firms (1-10 employees).

⁷ A survey conducted by the British Learning and Work Institute indicated that when participants had received financial support to partially or fully cover the costs of learning, they stated this learning would not have been possible otherwise (Pennacchia, Jones and Aldridge, 2018^[22]).

⁸ The analysis of PIAAC data also suggests that low-skilled and unemployed individuals are especially likely to face barriers "other" than traditional financial and time constraints.

⁹ Fana et al. (2020^[63]) analyse the restrictions on activities imposed in Italy, Spain and Germany. Based on the national confinement decrees, the authors classify all economic sectors on a scale of "essentiality". Across countries, sectors classified as "fully essential" cover food and pharmaceutical production, utilities, transport and health and receive an index of 1. In the other extreme, sectors classified as "non-essential" (e.g. leisure, hotel and restaurant activities) are assigned the index of 0. Intermediate activities are assigned an index ranging from 0 to 1, based on the degree to which they are required to satisfy fundamental needs.

¹⁰ If no assumptions about the feasibility of working and learning remotely are made, the average number of training hours an average worker would miss would be 26% larger. For purposes of simplification, the percentage of training maintained through working remotely is assumed to be equal for non-formal and informal training.

5

Navigating skill demands in turbulent times

This chapter presents evidence on the widespread impact of the COVID-19 pandemic on OECD labour markets by tracking the evolution of job postings published on line. The results indicate that the pandemic had heterogeneous effects on postings aimed at high- and low-skilled workers, and led to a surge in vacancies requiring employees to work remotely. The chapter discusses how, in the midst of such an uncertain period, workers need to become resilient by enhancing their ability to adapt to change. It explores new indicators identifying transversal skills, and the specific wage and employment returns these yield in the labour market. Looking ahead, the chapter analyses which occupations and skills are expected to increase or decrease in demand owing to megatrends, and proposes pathways for retraining workers who are most likely to be exposed to disruption.

Introduction

Learning, skill development and societal changes are intertwined. Individuals spend a large part of their lives in educational settings, acquiring life skills and preparing for a career. Once in work and society, skilled individuals are the driving force for change as they discover new ways to produce, organise work and have a meaningful impact on society. Change, in turn, is reflected in new skill demands as societies and labour markets evolve.

Change can either be abrupt and unexpected or take time to materialise, giving people the chance to anticipate and adjust to it. The COVID-19 crisis was a sudden and unprecedented event that dramatically transformed the life of virtually every person around the world. Fear of infection, strict public health guidelines and great uncertainty produced a sharp and sudden contraction in economic activity. The result was a deep and widespread shock to the labour market, with a serious impact on the demand for skills. Many industries were forced to cease operations to protect their workers' health and comply with policies aiming to contain the virus. Whenever possible, employers reorganised their operations to facilitate remote working, but many individuals lost their jobs and livelihoods. At the same time, the health crisis created shortages of workers in specific occupations (mainly healthcare and public safety), and labour markets and governments struggled to find skilled professionals to fill the gaps.

Before the COVID-19 pandemic, globalisation, technological changes, automation, digitalisation, artificial intelligence and big data as well as population ageing were already reshaping societies and the world of work at a breakneck speed. OECD estimates issued before the crisis projected that around 15% of current jobs would disappear owing to automation, and another 32% would require substantially different tasks and skills over the next 15 to 20 years (Nedelkoska and Quintini, 2018^[1]). Those driving forces (megatrends) did not come to a sudden stop with the pandemic. Instead, they will likely compound the effects of the COVID-19 crisis, accelerating changes in the way work is organised, and skills are used and demanded in labour markets.

Inevitably, the types of skills individuals need to master today differ from those they will need in the future. Lifelong learning systems play a fundamental role in bridging the distance between current skill needs and future demands by helping individuals anticipate changes, develop new skills and perfect others. Some skills can help individuals respond to both current and future skill demands equally. Transversal skills, such as complex problem solving, analytical skills and creativity, allow people to adapt to different situations and unexpected changes. They promote resilience and help individuals navigate both current and future labour markets and societies. Adopting a lifelong learning perspective, this chapter investigates three stages of skill development.

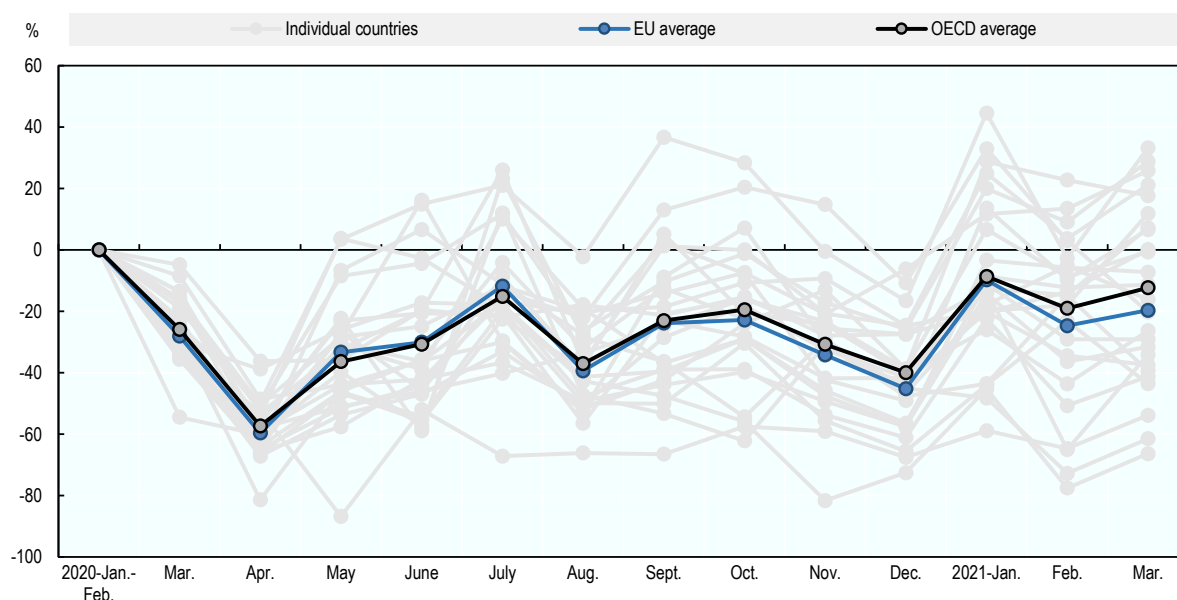
First, the chapter looks at the “urgency of now”, analysing the impact of the COVID-19 crisis on current skill demands and the reactions of economies around the globe. Second, the chapter looks into the future, assessing how skill demands are projected to change owing to megatrends such as population ageing, digitalisation and technological progress. It reviews the jobs that are projected to grow in the next 10 years and their associated skill requirements. Third, the chapter considers the interconnection between current and future skill demands, and the role transversal skills can play in connecting different stages of life. It proposes an innovative strategy to identify transversal skills, parsing the text used by employers to describe job offers on line. The results presented in this chapter emphasise the importance of lifelong learning as a tool to mitigate unpredictable shocks (such as the COVID-19 crisis) and anticipate the expected disruption resulting from structural megatrends. The chapter also highlights the potential of blending traditional statistics with more innovative approaches relying on the analysis of big data and online vacancies. Looking forward, these blended approaches will become increasingly important to understand with unprecedented timeliness and granularity the impacts of both sudden shocks and future trends.

The “urgency of now”: An assessment of the impact of the COVID-19 pandemic on labour-market and skill demands using online vacancies

The COVID-19 crisis is transforming the lives of all individuals around the globe. The severe consequences on public health have been matched by sharp declines in economic activity and upheavals in labour markets. Preliminary evidence suggests that COVID-19 has had a considerably vaster impact than the 2008 Great Financial Crisis (e.g. OECD (2020^[2])). The analysis in this chapter confirms these results as it explores the evolution of vacancies published on line across a range of countries during the pandemic (see Annex 5.A for more details on the data sources and methodology used for the analysis).

Figure 5.1 presents the observed change in the number of job postings published on line between March 2020 and March 2021. It compares the volume of jobs advertised on line during the pandemic to the period spanning January-February 2020, immediately before its first effects came to light. The figure shows that the number of new jobs posted on line, on average across the OECD, dropped by approximately 60% by April 2020. Croatia, Denmark and the Slovak Republic experienced among the sharpest declines in job postings in the initial period of the pandemic (March-May 2020). In France, the Netherlands and the United States, the contraction in job offers posted on line was milder – although still substantial. By July 2020, several countries experienced a relative improvement, with a reduction in the contraction of new jobs published on line. However, total jobs published on line at the end of March 2021 were still considerably lower than during the pre-crisis period in a variety of countries.

Figure 5.1. Evolution of online job vacancies



Note: The figure shows the percentage change in the number of online job postings by country relative to the pre-crisis period (i.e. average of January and February 2020). Belgium, Finland, Hungary, Malta, New Zealand, Portugal and Sweden are omitted from the analysis due to small sample size or high volatility observed in the studied period. Country-specific results are available from the Statlink below.

Source: OECD calculations based on data from Burning Glass Technologies, May 2021.

StatLink  <https://stat.link/1pza7e>

As the SARS-CoV-2 virus began to spread, virtually all countries worldwide introduced containment and mitigation strategies, such as limiting the movement and travel of individuals, closing schools and other educational institutions, halting non-essential activities and postponing non-essential medical procedures¹ (Bai et al., 2020^[3]). Although the exact nature, timing, scope and intensity of responses varied substantially across countries – and sometimes even within countries (Hale et al., 2020^[4]) – the containment measures inevitably had a profound impact on labour markets.

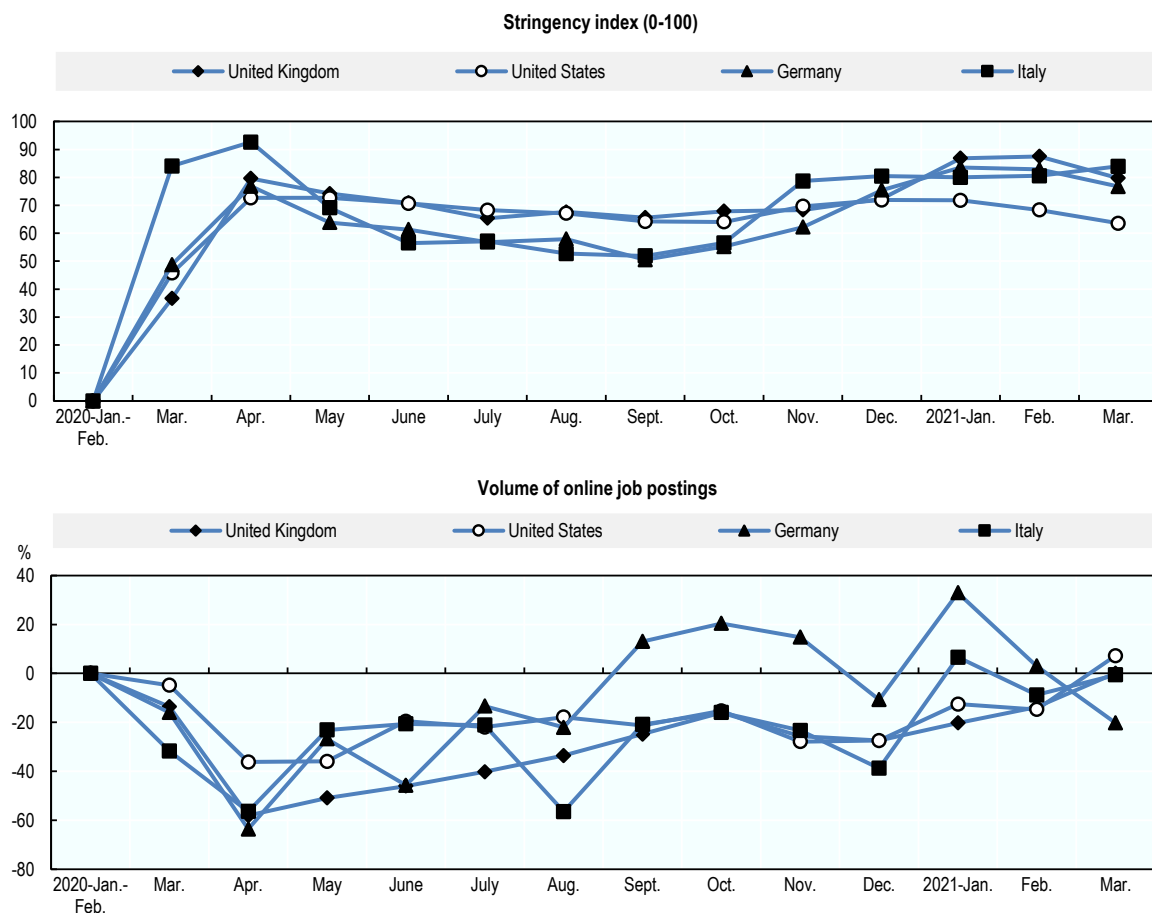
Figure 5.2 illustrates both the stringency of national measures adopted during the crisis and the evolution of online job postings in the corresponding countries.² The upper panel of Figure 5.2 presents the “stringency index”, a composite measure of the number and strictness of government policies (e.g. school closures, limitations to the size of public gatherings, restrictions on freedom of movement within a country in terms of timing and distance travelled, workplace closures and travel bans). The stringency index ranges from 0 to 100, with 100 indicating the highest degree of strictness.³ The lower panel of Figure 5.2 presents the evolution of online job postings relative to the pre-crisis period of January-February 2020. The results show a clear association between the sharp increase in policy stringency (corresponding to the implementation of lockdowns around March 2020) and the decline in online job postings until April 2020. In later months (starting from May 2020), some countries (e.g. Italy and Germany) eased restrictions. Correspondingly, the volume of online job postings started to recover, but with extreme volatility over time and a more tenuous association with the intensity of the stringency index between May 2020 and March 2021.

Different (and in some cases competing) factors could explain a weaker correlation between policy stringency and the evolution of online vacancies beyond the initial phase of the pandemic. First, some businesses may have ceased operations permanently during government-imposed restrictions. Second, even after some regulations were relaxed, many employers may have chosen to defer new hiring as new measures could be imposed if viral transmission increased. Third, aggregate economic demand – a key driver of labour demand – may not have increased as soon as restrictions were eased, because some customers were reluctant to revert to pre-crisis spending levels owing to job uncertainty or loss of income during generalised closures.

At the moment of writing this report, governments are delivering vaccines to the general population, starting with at-risk groups and frontline workers. Containment measures are still likely to remain in place as long as the virus keeps spreading at considerable speed. Thus, economic activity and new job postings should remain well below their pre-crisis period until the number of infections is brought under control.

Figure 5.2. Stringency of COVID-19 measures and online job postings

Germany, Italy, United States and United Kingdom, 2020 and 2021 (Q1)



Note: The top panel shows the evolution of stringency index (monthly averages) taken from the Oxford COVID-19 Government Response Tracker (OxCGRT), a systematic way to track government responses to COVID-19 across countries and sub-national jurisdictions over time. The bottom panel shows the percentage change in the number of online job postings relative to the pre-crisis period (i.e. average of January and February 2020) for selected countries.

Source: OECD calculations based on data from Burning Glass Technologies, May 2021; Hale et al. (2020^[4]), Oxford COVID-19 Government Response Tracker, <https://covidtracker.bsg.ox.ac.uk/>.

StatLink  <https://stat.link/gifxvm>

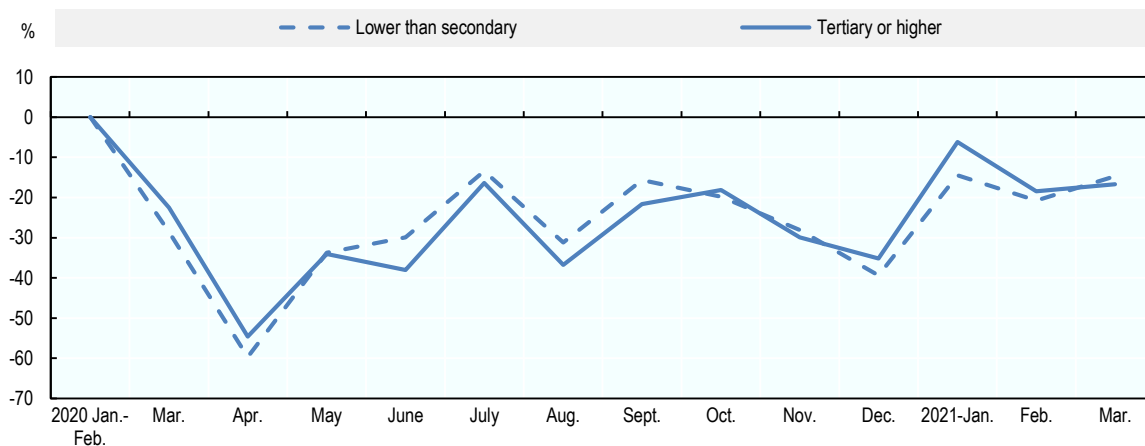
The impact of the COVID-19 crisis on the number of online vacancies varies by educational level

While the COVID-19 pandemic hit virtually all sectors of the economy simultaneously, the analysis of online vacancies suggests that many low-paid and often low-educated workers were particularly affected during the initial phase of the COVID-19 crisis. Figure 5.3 compares the volume of job postings in 2020 and the first quarter of 2021 to the pre-crisis period (January-February 2020), disaggregating the change in job advertisements according to the required educational level stated in the vacancy posted on line. The results show that, on average, new online job postings requiring a secondary education (or lower) decreased more

than those requiring tertiary education at the start of the pandemic while, as the pandemic progressed, the reverse occurred. In other words, in March and April 2020 the drop in new jobs was sharper for low-skilled jobs while in later periods it was sharper among high-skilled jobs.⁴

Figure 5.3. Evolution of job postings by educational level, OECD average

March 2020 – March 2021



Note: The figure shows the percentage change in the number of average monthly online job postings between March 2020 and March 2021, relative to the pre-crisis period (i.e. average of January and February 2020) by minimum education level required of either secondary or lower and tertiary or higher. Job postings that lack information on education requirements were discarded. The OECD average is unweighted and Belgium, Croatia, Czech Republic, Denmark, Finland, Hungary, Malta, New Zealand, Poland, Portugal, and Sweden have been dropped due to small sample size or high volatility observed in the data.

Source: OECD calculations based on data from Burning Glass Technologies, May 2021.

StatLink  <https://stat.link/jqy291>

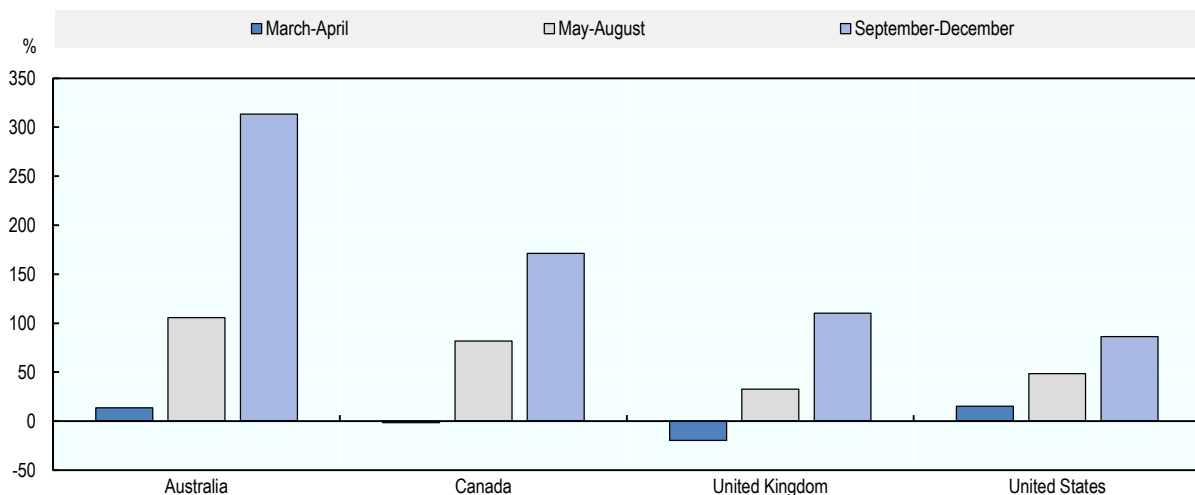
The share of online job openings requiring working from home increased markedly from mid-March 2020 onwards

Numerous studies have attempted to estimate the jobs that can be performed directly from home (e.g. Dingel and Neiman (2020^[5]); Espinoza and Reznikova (2020^[6])). The results of this strand of literature indicate that around 30% of individuals across OECD countries can perform job-related tasks remotely (Espinoza and Reznikova, 2020^[6]). These studies have typically analysed the tasks performed by workers in various occupations and indirectly inferred the degree to which tasks in broad occupational groups can be performed remotely, based on tasks that were performed before the crisis (Dingel and Neiman, 2020^[5]). The analysis of the information contained in online vacancies, instead, makes it possible to determine whether the individual vacancies require the person to work from home, as explicitly stated by the employer in the job posting.

The results of this analysis (Figure 5.4) show that during the COVID-19 health crisis, working-from-home arrangements gained traction relative to the pre-crisis period, in line with evidence from Galasso and Foucault (2020^[7]) and OECD (2020^[2]). Remote working arrangements helped maintain a degree of economic activity in those sectors and occupations that could reorganise their operations to comply with sheltering-in-place regulations or social distancing guidelines.

In Australia, the number of new job postings requiring individuals to work from home has steadily increased since the onset of the crisis, doubling in size between May and August 2020 and increasing even further up until the end of 2020. Other countries, particularly the United Kingdom and Canada, have also seen a considerable increase in online vacancies requiring such arrangements relative to the pre-crisis period (January-February 2020). It is too early to assess whether this trend will persist once the infection is brought under control and mitigation policies have eased. However, digitalisation was already growing and permeating the economy prior to the crisis, and these dynamics are certain to continue. A survey of employers conducted by the World Economic Forum (2020^[8]) indicates, for instance, that large firms plan to expand remote working arrangements, with the potential to move 44% of their workforce to operate remotely.

Figure 5.4. Evolution of job postings by “working-from-home” requirement, 2020



Note: The figure shows the percentage change in monthly online job postings with working-from-home requirement, relative to the pre-crisis period (i.e. average of January and February 2020). EU countries are not included due to the lack of information on working-from-home requirement. New Zealand is dropped owing to small sample size. Data for the United States come from the Burning Glass Technologies' Labor Insight online tool and are averaged monthly. For the United States only, the latest period covers August-October 2020.

Source: OECD calculations based on data from Burning Glass Technologies, May 2021; Burning Glass Technologies (2020^[9]), Labor Insight, <https://www.burning-glass.com/products/labor-insight/>.

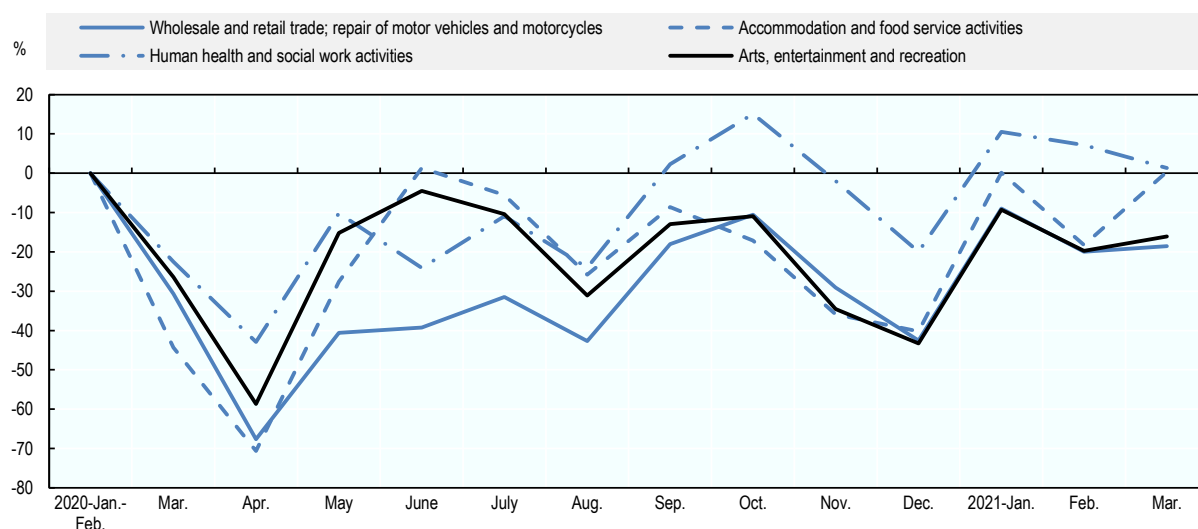
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Online job postings declined in some sectors and occupations more than in others

Although the volume of online job postings has declined in virtually every sector, heterogeneity exists across sectors. Some industries and sectors maintained most of their operations and sometimes even experienced a surge in demand, while others were forced to reduce or halt their operations. Figure 5.5 indicates that, on average across European countries for which information is available, the healthcare and social assistance sectors experienced a milder decline relative to other sectors. While the drop in new vacancies in this sector was very significant at the onset of the pandemic, the gap relative to the pre-pandemic period closed already in May and June 2020. In August of the same year the number of new job postings in the sector exceeded the average of January and February 2020, signalling the strong demand for healthcare professionals. Jobs in the wholesale and retail trade sector, instead, dropped significantly

at the beginning of the pandemic and are only slowly starting to recover in recent months. A similar pattern is observed in accommodation and food service activities where online job postings dropped by a staggering 70% in April 2020 and recovered only in recent months. Jobs in the arts, entertainment and recreation sector are still below the pre-crisis level.

Figure 5.5. Evolution of online job postings by sector, European Union average (selection)



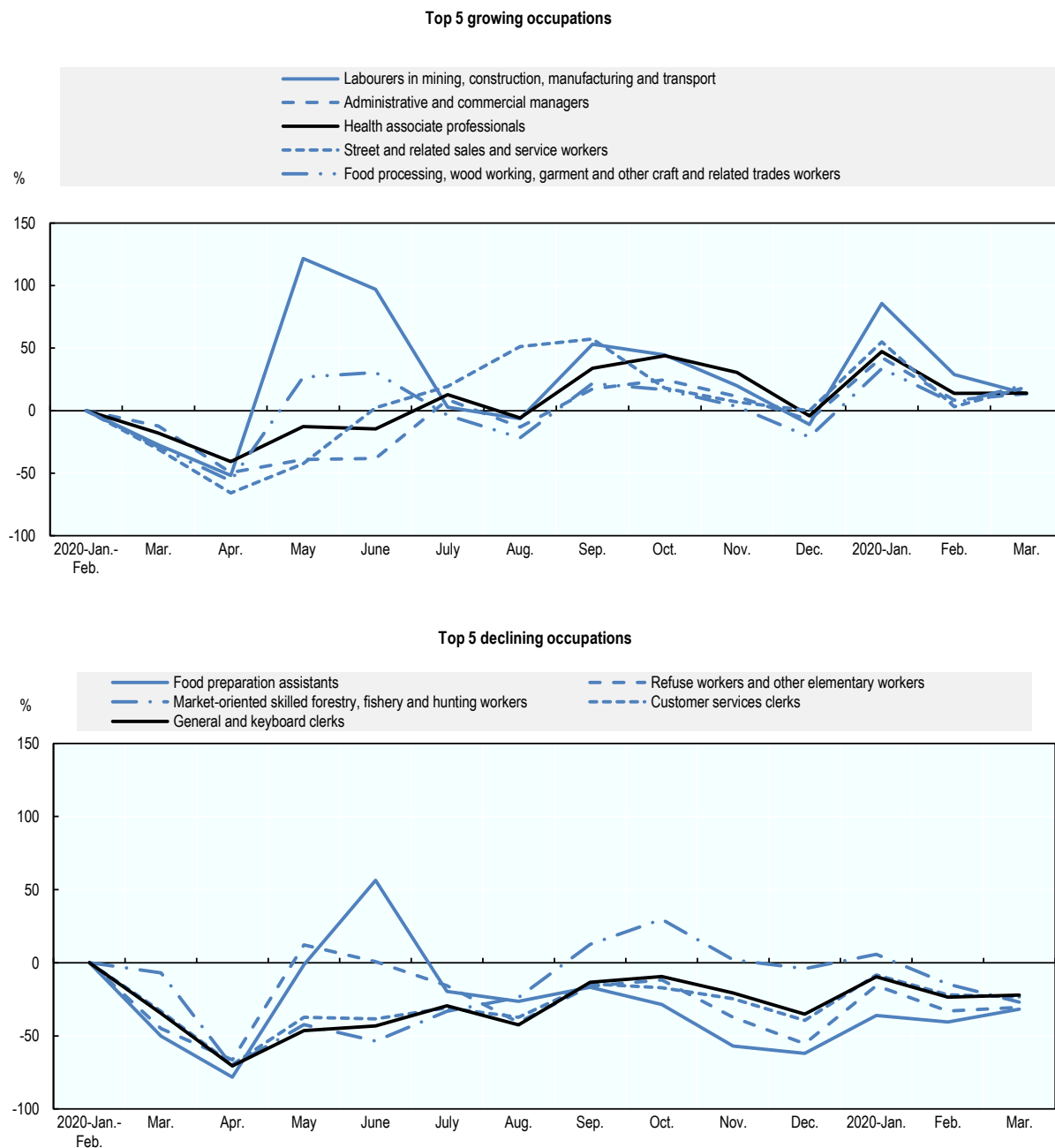
Note: The figure shows the percentage change in the number of online job postings for the EU-average, relative to the pre-crisis period (average of online job postings in January and February 2020) for selected sectors (NACE rev.2, 1 digit). Belgium, Finland, Hungary, Malta, Portugal and Sweden are not included in the calculation of the EU average due to small sample size, or high volatility observed in the data.

Source: OECD calculations based on data from Burning Glass Technologies, May 2021.

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The COVID-19 pandemic has also had a heterogeneous impact on specific occupational groups within sectors (OECD, 2020^[10]). The number of online job openings – particularly for occupations such as essential workers, hospital staff, employees of food retailers and warehouse personnel – remained constant or increased, even as policy makers in many countries severely limited economic activities and freedom of movement.

Figure 5.6. Top and bottom occupations by volume of online job postings during the COVID-19 pandemic, European Union



Note: The table shows top five and bottom five occupational groups (2-digit ISCO level) by change in online job postings in between March 2020 and March 2021 compared with respect to the pre-crisis period (i.e. average of online job postings for January and February 2020). Postings missing information on the occupation of affiliation were discarded. Results show the EU27 unweighted average for each occupational group, excluding Belgium, Finland, Hungary, Malta, Portugal and Sweden that have been removed from the analysis due to high volatility observed in the data.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

Figure 5.6 (upper panel) shows the top five occupational groups (2-digit ISCO) that grew the most across job advertisements published on line in between March 2020 and March 2021. Results show that, after the first peak of the pandemic (April-May 2020), the demand for health associate professionals grew steadily across the EU countries analysed exceeding, in March 2021, the pre-pandemic level. In many European countries (including France, Ireland, Italy and Spain), online job openings for occupations such as nurses, personal care workers, medical doctors and medical technicians increased in the months following the onset of the COVID-19 emergency.

Other occupational groups that were not (or only marginally) affected by containment measures and mandatory physical closures registered an increase in job openings, particularly in logistics and distribution. Labourers in mining, construction, and manufacturing and, in particular, the transport sector experienced amongst the highest growth rates in online job postings at the beginning of the pandemic as well as throughout the whole period analysed. In Europe (particularly in Lithuania and Romania), job openings for transport and storage workers increased or remained constant after the onset of the health crisis.

Similarly, in Australia, Canada, the United Kingdom and the United States, demand for professionals such as physicians, nurses, pharmacists, epidemiologists, care assistants and technicians increased strongly. Between March and November 2020, online openings for emergency medical technicians and paramedics in the United Kingdom increased by 34%, and online openings for medical equipment repair technicians grew by 114%. In the United States, online vacancies for physical scientists increased by 10% and demand for epidemiologists and community health workers remained stable, always relative to the beginning of the year.

Online job vacancies in order processing and packaging increased by nearly 50% in the United States compared to the beginning of the year, and advertisements for packaging jobs increased by around 47% in Australia and the United Kingdom. This suggests that online shopping, and the associated delivery of goods directly to customers, have also grown significantly as a result of social distancing measures and the fear of contracting the virus when leaving home.

The various containment measures and closures encouraging individuals to remain home and reduce social interactions led to a decrease in the volume of online postings for jobs involving face-to-face interactions. Figure 5.6 (lower panel) shows the five occupations for which online vacancies decreased most sharply across EU27 countries relative to the pre-crisis period. On average across the EU, online job postings for food processing, wood working, garment and other craft and related trades workers fluctuated significantly, dropping by more almost 80% in April 2020 and remaining, in March 2021, to a level that is approximately 30% below the average volume of online vacancies recorded prior to the pandemic (i.e. January and February 2020). In many European countries, including Italy, Spain, Germany and Denmark, online job postings for waiters and bartenders, cooks and food preparers dropped by as much as 80% over March-July 2020 and, in the United Kingdom, the volume of online vacancies for baristas, bussers and bartenders contracted by 72% over March-November 2020. In Denmark, Spain and Latvia, the number of openings for shop salespersons also declined extensively. General and keyboard clerks as well as customer service clerks also recorded significant decreases in the volume of online job postings during the pandemic, standing in March 2020 at levels that are 20 to 30% lower than those prior to the pandemic.

As mentioned above, occupations in the tourism and leisure sectors were also hit hard. In many European countries, online job postings for client information workers fell by 70% compared to the beginning of the year. In the United States, Canada and the United Kingdom, advertisements seeking travel agents, tour guides or flight attendants dropped by 70-90% over March-November 2020. Online vacancies for bell persons and baggage attendants also decreased considerably in both the United Kingdom and the United States. Similarly, online postings for meeting, convention and event planners dropped by 68% in Australia, 67% in Canada, 83% in the United Kingdom and 79% in the United States.

The role of transversal skills in navigating the labour market

In a rapidly changing world, developing “transversal skills”, i.e. skills that are “not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings” (UNESCO, 2021^[11]) is key if workers are to become resilient to shocks triggered by rapid technological change and megatrends or a sudden and unexpected crisis such as the current pandemic.

Even though previous literature has devoted considerable attention to the study of transversal skills, no clear agreement exists on what transversal skills really are and how they can be measured. Recent studies have used a wide variety of terms (i.e. soft, cognitive and non-cognitive, interpersonal and social skills) interchangeably, and many of those terms/concepts overlap. Similarly, empirical studies have struggled to find robust measures to assess their impact on labour-market outcomes, such as wages and employment prospects.

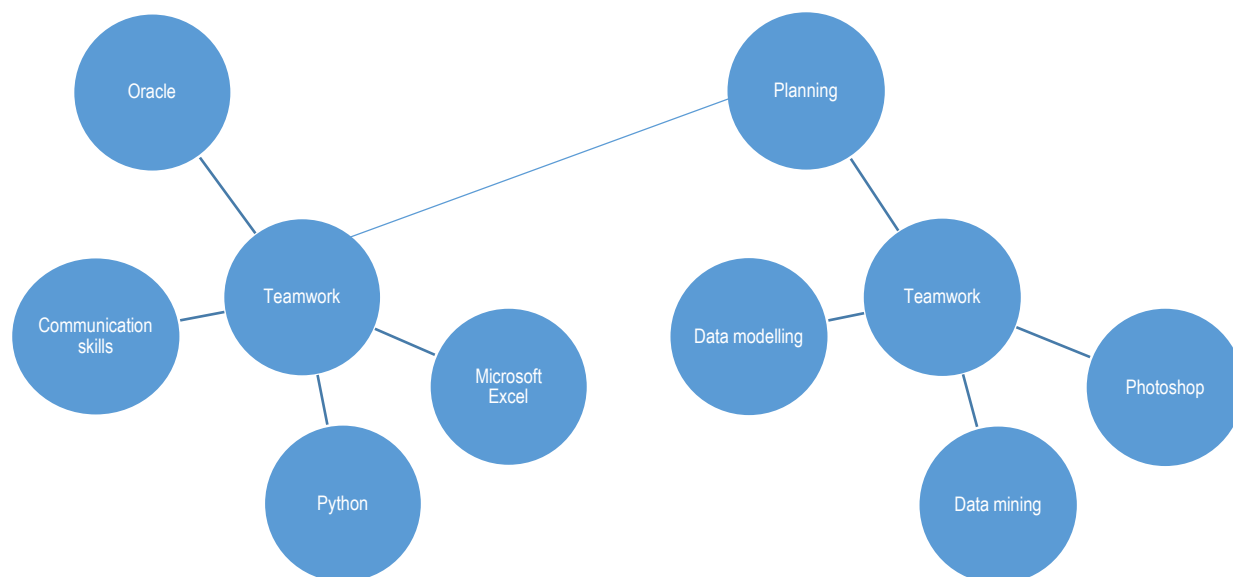
Among the (few) attempts to provide a catalogue of transversal skills, the European Centre for the Development of Vocational Training (Cedefop)'s European skills and Jobs survey (CEDEFOP, n.d.^[12]) identifies communication skills, team-working skills, customer handling skills, problem-solving skills, learning skills, and planning and organisational skills as essential “transversal skills”. However, little is said on the precise criteria for selecting these skill keywords or the degree of “transversality” of each skill.

The European Union has also sponsored different Erasmus+ projects to develop catalogues and lists of transversal skills. The Assessment of Transversal Skills (ATS2020, 2021^[13]) puts “digital literacy” at the core of its transversal skills framework, along with information literacy, collaboration and communication, creativity and innovation, and autonomous learning. The Keystart2work (n.d.^[14]) project lists different keywords, such as decision-making, organisational and time management, and even negotiations skills.

The approach followed in this chapter to identify transversal skills draws upon recent developments in natural language processing (NLP) and machine learning (ML). More precisely, NLP approaches allow transforming textual and semantic information contained in the text of job postings into mathematical values that retain the semantic meaning of the original words (Box 5.1). This approach, initially developed by Google in its PageRank algorithm, makes it possible to qualify the number and importance of the connections among keywords, where more and better-“interconnected” skills are labelled as “transversal” (see also Djumalieva, Lima and Sleeman (2018^[15])).

Figure 5.7 provides a simplified example of how skills can connect in a so-called “graph”. Here, the skill keyword “teamwork” is connected to a relatively large number of other keywords – some of which, in turn, are closely connected to a large number of other keywords in the graph (e.g. the case of “planning” skills). The quantity of the connections and their importance (i.e. the number of their further connections) are used to compute the so-called “eigenvector centrality index”, which represents empirically the degree of “transversality” of each skill keyword in the database (Box 5.1).

Figure 5.7. Skill connections and transversality: A graphical example



Note: Bubbles represent examples of keywords collected in online vacancies. Junctures indicate the existence of a relationship between keywords when they are mentioned together in vacancies. The chart is not meant to give a concrete representation of the many different connections among keywords throughout the database as this chart is provided as an example of how keywords may be connected to each other.

Box 5.1. Leveraging machine learning and online job postings to detect transversal skills

Recent developments in NLP allow sophisticated analysis of the information contained in online vacancies. ML algorithms, particularly ‘word embeddings’, can be used to extract and analyse the relationships between individual skill keywords featured in job postings.

Word-embedding algorithms function by creating a mapping between words and their meaning (semantics) in so-called word vectors. These word vectors are, in practice, the mathematical representation of the semantic meaning of the words in an n -dimensional vector space, where words with similar meanings occupy close spatial and mathematical positions. Based on their meaning, for instance, the words “queen” and “king” are likely to have similar word vectors and to be close in the mathematical vector space as they are also semantically related, even if the letters of the alphabet that make up each word are totally different.

From an empirical point of view, estimating word vectors requires “fitting the data” or the “corpus” (i.e. the collection of all words to be analysed – in this case, the texts of millions of job postings) by solving an optimisation problem. The “semantic analysis” relies on identifying the key text elements in the corpus (i.e. the set of all sentences), and assigning those elements to their logical and grammatical role in the semantic context. Word-embedding approaches rely on the theory of linguistics developed in the “distributional hypothesis” (Harris, 1954^[16]), which states that words occurring in similar contexts tend to have similar meanings and share common characteristics (Erk, 2012^[17]). In semantic analyses, the “context” is obtained by examining the words surrounding the target keyword, which helps understand how the different relationships between keywords represent different relationships between concepts and ideas.

Conveniently, once word vectors are created in the n -dimensional space, they can be treated as numerical values, and arithmetic operations/manipulations can be performed with them. Intuitively, these arithmetic operations retain the semantic meaning of words, and the results of such mathematical operations are therefore expected to return semantically and logically meaningful results. For instance, once word vectors have been estimated, the following calculation could be performed:

$$\text{vec}(\text{"Madrid"}) - \text{vec}(\text{"Spain"}) + \text{vec}(\text{"France"})$$

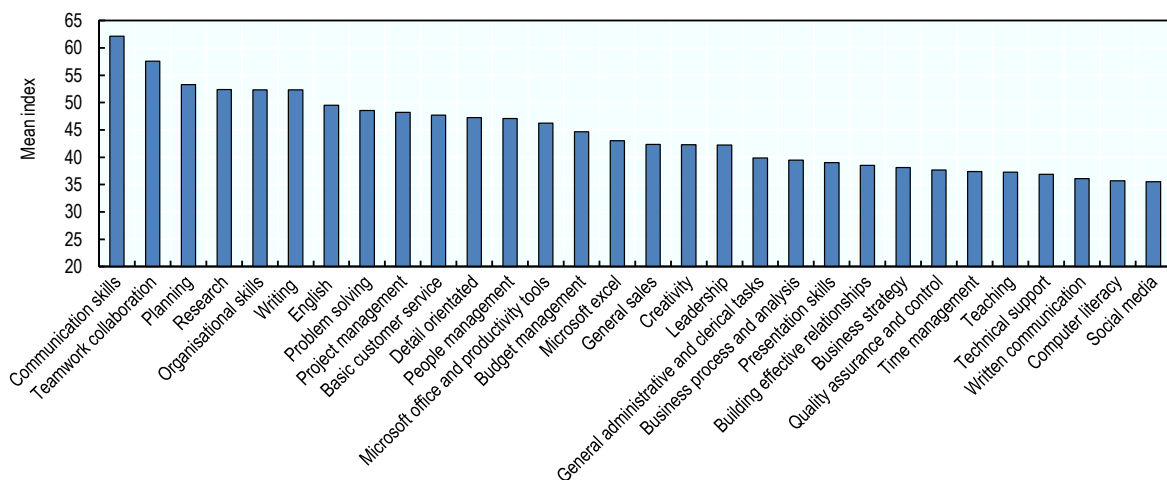
resulting in a vector closer to $\text{vec}(\text{"Paris"})$ than to other word vectors (Mikolov et al., 2013^[18]). From a mathematical point of view, this means that if two words share a similar meaning (e.g. Paris and Madrid, which are both country capitals), the cosine of the angle between their vector representations should be close to 1, i.e. an angle close to 0.

A key property of word embeddings and the vector representation of skill keywords in the n -dimensional space is that they allow calculating the number and quality of connections between each skill across the entire set of online vacancies. Being slightly more precise, the connections between a group of keywords can be represented by a mathematical structure called “graph”. In such a graph, the skill keywords extracted from online vacancies represent the vertices (also called nodes), which can either be connected when both vertices co-occur in a specific job vacancy or disconnected when both vertices never co-occur in the same vacancy.

In graph theory, “eigenvector centrality” is a measure of the influence of a node in a network. Google developed and uses this measure widely in its PageRank algorithm to quantify the importance of the connections among web pages. This chapter follows the same approach, using the eigenvector centrality index to measure the importance of the connections between skills across millions of job vacancies. Skills that have stronger connections across different occupations and job postings, and therefore high eigenvector centrality, are identified as “transversal”.

Figure 5.8. Top 30 transversal skill keywords, by degree of transversality

United Kingdom, 2017-2019



Note: The chart presents the 30 most transversal skills, knowledge areas and technologies emerging from the ML analysis of the text contained in online job postings in the United Kingdom in between 2017 and 2019. Larger bars denote stronger transversality calculated as the eigenvector centrality of each keyword in the corpus of labels collected in online vacancies.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.


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Figure 5.8 presents the list of the 30 most transversal skills (i.e. those with the highest eigenvector centrality score, see Box 5.1) across online vacancies collected in the United Kingdom in between 2017 and 2019.⁵

The list of top 30 transversal skills is rather heterogeneous, containing soft and technical skills as well as several business-related skills that are shown to be key in many different roles and across various occupations. Amongst the 30 most transversal keywords across online job postings there are communication skills, teamwork collaboration and planning skills. Problem-solving, creativity and relationship-building skills are also highly transversal and important personality traits that are interconnected with a wide variety of vacancies, jobs and tasks in the online postings.

The analysis in Figure 5.8 confirms that a wide variety of jobs today require some knowledge of how to approach and respond to customers effectively or project management skills. Several transversal keywords refer to business-related skills, such as the ability to provide basic customer service, manage a budget (e.g. “budget management”) or provide administrative support. These skills are crucial not only in sales occupations, but also in a much broader set of job descriptions (from plumbers to administrative staff) entailing one-on-one interactions with clients. For instance, among the occupations where basic customer service skills are key, Careerbuilder.com (a well-known website providing career guidance to jobseekers) mentions home health aides, service technicians, housekeepers and even food service workers (CareerBuilder, 2021^[19]). Examples of occupations requiring at least basic knowledge of how to interact with clients are, however, virtually countless.

The results in Figure 5.8 also show that digital skill or the ability to operate a digital technology are transversal competencies needed across a wide variety of jobs. This confirms previous results (OECD, 2019^[20]) highlighting that digital skills are permeating societies and labour markets not only in high tech occupations, but across virtually all jobs and sectors. Microsoft Office and Productivity tools, Microsoft Excel and computer literacy are among the most transversal digital technologies used in a wide variety of work contexts and tasks. Interestingly, “social media skills” are also highly transversal requirements, reflecting the surging importance of digital platforms in a variety of positions, including business and sales, customer service, management and administration, and financial services (Box 5.2).

Box 5.2. Social media skills: How are these competencies increasingly permeating labour markets?

Social media have grown into a channel for firms of all sizes to communicate with the public. Indeed, brands use their presence on social media accounts to build their reputation, which is ultimately key to their success and growth. A growing number of jobs are therefore incorporating social media-related tasks in their daily routines, and workers must know how to operate them effectively.

In an opinion piece, the leadership consulting firm SpencerStuart (2014^[21]) highlights that:

...social media provides brands with an intimate platform to connect with customers and shape their perceptions, whether through timely and targeted promotions, responsive customer service or the creation of communities of interest. On the other, social media has unquestionably shifted power to the individual, who can tarnish long-established brands with a single angry blog post or quickly coalesce vast numbers of people behind a cause. Organizations’ successes, failures and missteps are now on display as never before.

The empirical evidence on the demand for and use of social media skills is still scarce, but survey data collected by eMarketer in 2014 among US companies with 100 or more employees found that 88% used (or were planning to use) social media platforms to market their products. This does not only mean that marketing managers or social media managers must use social media channels. In fact, the way social media are used in the workplace is fundamentally changing. Reports from Indeed.com (a website publishing job vacancies) stress that social media skills are increasingly required in different occupations and at different levels, from executive assistants to senior vice-presidents.

An analysis of wage and employment returns based on online vacancies

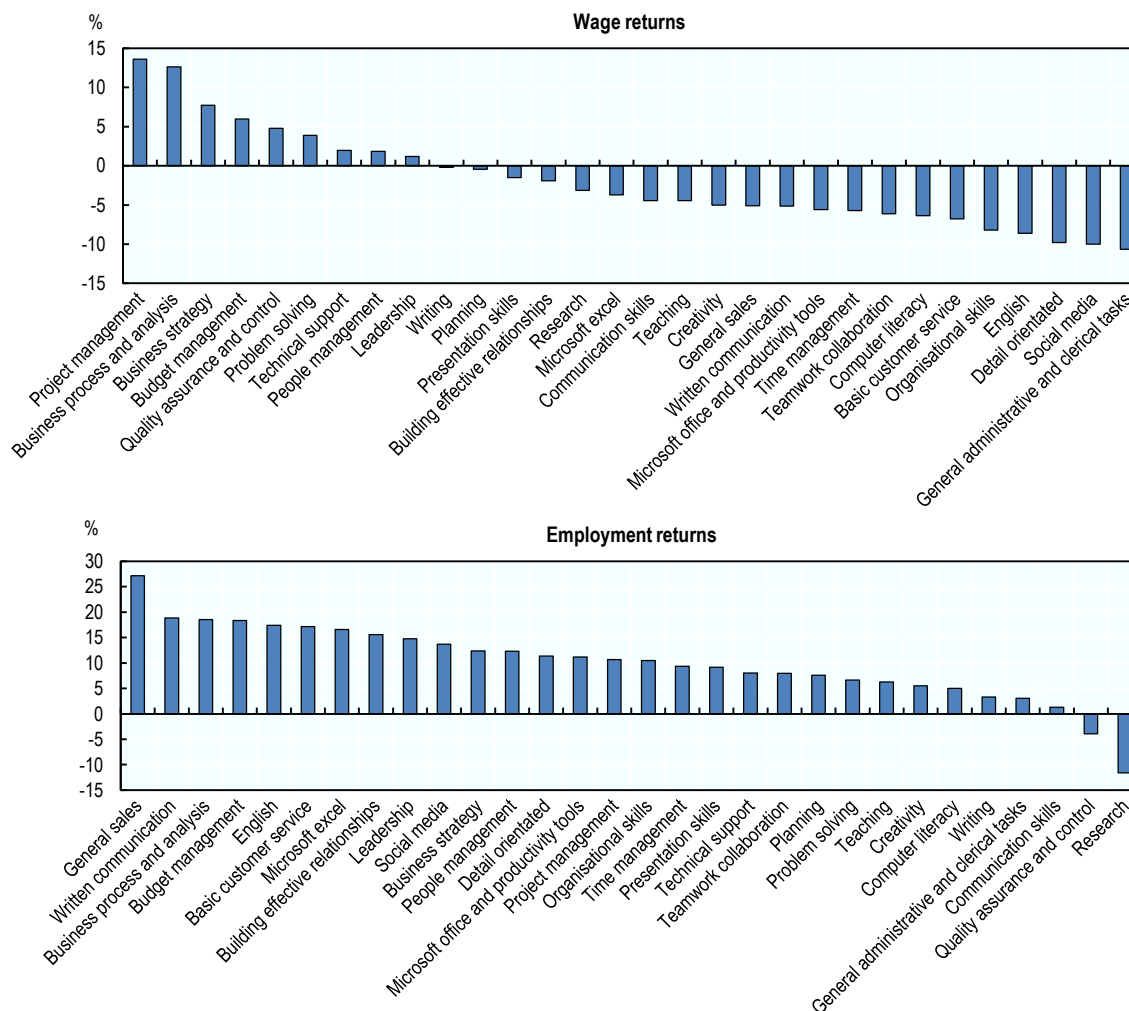
The perceived importance of transversal skills has been growing in the public debate. Reports based on surveys of employers around the world seem to corroborate the idea that transversal skills are in strong demand, and that firms often struggle to find workers with high associated skill levels (Cunningham and Villaseñor, 2016^[22]).

Until now, however, empirical evidence has been mixed. Limited data availability has impeded the investigation of the labour-market returns of transversal skills where previous empirical studies have focused on a small set of empirical measures with limited comparability. The advent of large data sets of online vacancies, and the information contained therein, now allow both identifying a large set of transversal skills, and assessing and comparing their wage and employment returns in the labour market.

Figure 5.9 presents the estimated wage and employment returns associated with the top 30 most transversal skills mentioned in online job postings published in the United Kingdom between 2015 and 2019 (details on how the analysis was performed are available in Annex 5.C).

The results show a wide heterogeneity among the labour-market returns (both in terms of wage and employment possibilities) associated with each transversal skill. The transversal skill keywords associated with positive wage and employment returns include knowledge areas such as project management, business process and analysis as well as business strategy and budget management. Project management skills associated with large wage returns usually involve the planning, execution and control of a project, the assessment of the project's risks and opportunities and the management of the resources needed for its completion. Within the project management skills, in recent years the 'agile approaches' have been amongst the most widely used. Agile project management involves breaking a project up into different phases and the engagement of stakeholders and customers in its continuous improvement at every stage. The ability to perform all these tasks (grouped under the label 'project management skills') has become widely required across a variety of different jobs and roles and results from the analysis of online job postings show that this type of skill is associated with an average 14% wage premium and 11% elasticity to job openings. Similarly, knowledge of how to run a business effectively and create a successful strategy (e.g. "business strategy") or to effectively manage budgets rank among those skills that pay off most, both in terms of wage and employment opportunities. Problem solving, people management, leadership and planning are also amongst the transversal skills that are associated with positive and high wage returns, indicating that jobs requiring higher levels of these skills usually pay higher wages. Strong digital skills and the ability to operate digital software like Microsoft Excel or social media are also associated with significant wage returns pointing to the importance of digital skills in supporting individuals' labour market success (see Box 5.3).

Figure 5.9. Wage and employment returns associated with transversal skills



Note: Results are based on separate ordinary least squares (OLS) regressions for each skill keyword that control for average years of education and job-skill complexity, as well as a set of county-level geographical fixed effects and, sector-time and time dummies for the years 2015, 2017 and 2019. All coefficients are statistically significant at 1% level. Coefficients are beta standardised. Results are ordered by the magnitude of the returns in each panel into four groups according to the intensity of the wage and employment returns, and are ranked by the largest wage return in each group. Wage and employment returns indicate the estimated change in wage and job openings associated with a 1 standard deviation increase in the relevance of the skill considered. Positive and larger coefficients indicate that increasingly higher values of the skill are associated with higher wages and more employment opportunities than average.

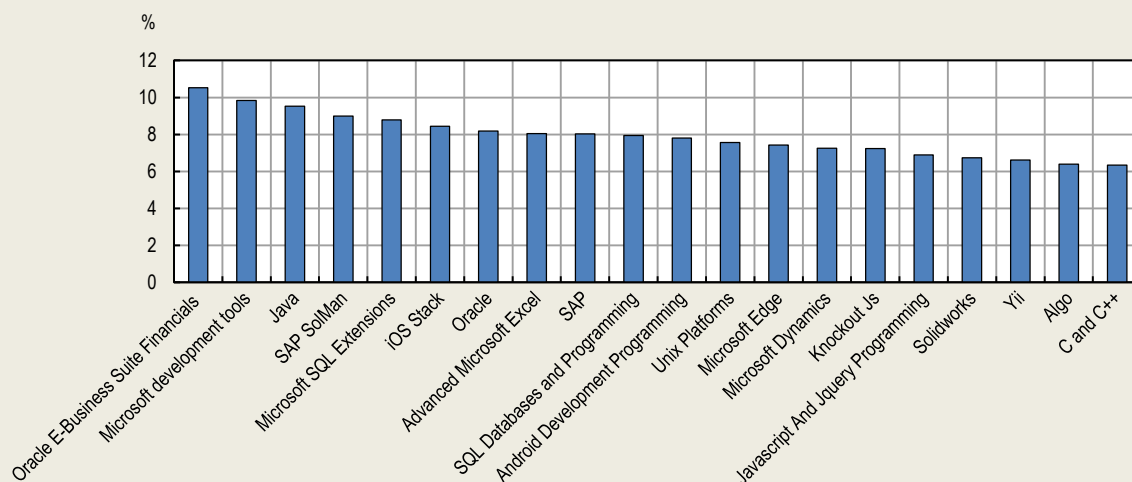
Source: OECD calculations based on Burning Glass Technologies data, May 2021.

Box 5.3. Developing digital skills: A way to labour market success?

The analysis of online job postings allows to investigate the specific wage returns associated with a wide range of digital skills. Results in Figure 5.10 show that the most widespread digital skills and technologies identified in online job postings are also yielding significant wage returns in the labour market. Among the digital skills leading to the largest wage returns there are Oracle E-business suite financials, Microsoft development tools and Java (a general-purpose programming language for developers). While the demand for specific digital skills is likely to evolve even more rapidly than other demands in the labour market due to the pace of technology progress, results highlight that individuals who are able to keep up with these rapid developments are also able to gain significant wage premium in jobs that are thriving in current labour markets.


Figure 5.10. Top digital skills by wage returns in the United Kingdom

Wage returns of digital skills and technologies, United Kingdom 2015-2019



Note: Results are based on separate ordinary least squares (OLS) regressions for each skill keyword that control for average years of education and job-skill complexity, as well as a set of county-level geographical fixed effect and time dummies for the years 2015, 2017 and 2019. All coefficients are statistically significant at a 1% confidence level. Coefficients are beta standardised. Results are ordered by the magnitude of the returns. Wage returns indicate the estimated change in wage associated with a 1 standard deviation increase in the relevance of the skill considered. Positive and larger coefficients indicate that increasingly higher values of the skill are associated with wages that are above the average in the United Kingdom's labour market for the period in between 2015 and 2019.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

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When turning to the association between each transversal skills and the number of job openings, results in Figure 5.9 show that general sales, written communication and business process and analysis are amongst the skill requirements that are associated with the largest employment returns, suggesting that individuals with high levels of those skills are likely to be exposed to a larger number of job openings than on average.

When analysing skill returns, it is important to notice that jobs require a combination of skills to perform tasks, so that each occupation relies on “skill bundles” or skill sets rather than on one single skill. The specific return associated with a particular skill is, therefore, also linked to how this skill is operated in conjunction with other skills and in each particular work context. The analysis of online vacancies reveals that “high-paying” and “low-paying” transversal skills tend to bundle with skills of different nature and that the way skills bundle with each other may be key in defining labour market returns.

Further investigation of the data shows, in fact, that high-paying transversal skills ‘bundle’ (i.e. are usually demanded in conjunction) with technical skills more often than is the case for low-paying transversal skills. In addition, low-paying transversal skills are deployed more frequently in generic occupations (i.e. jobs that do not require high levels of technical and specialised skills), while high-paying transversal skills are more prominent in jobs requiring strong command of technical and highly specialised skills.

Figure 5.11 presents the list of skills that bundle most strongly with project management skills across jobs published on line. The results show that project management skills correlate strongly with only a few other transversal skills (business process and analysis, for instance) while they appear to bundle with a variety of different technical and narrower skills such as the knowledge of utility infrastructure design and maintenance, the knowledge of impact assessment procedures or of engineering management. Interestingly, results suggest that project management skills bundle with several skills in the green economy sector such as the knowledge of environmental work or green architecture and with IT technical skills.⁶

Figure 5.11. Project management skills bundle

United Kingdom, 2015-2019

Environmental work	Budget management	Impact assessment	Carbon management	Tidal power	Structural steel design	Seismic engineering	Business process and analysis
Project management software	Environment agency	Sustainable engineering	Steel connection design	Analytical skills	lpx spx	Data analysis	Geotechnical engineering
Utility infrastructure design and maintenance	Environmental geology	Carbon reduction	Surveys	Supplier relationship management	Material flow analysis	Sustainable energy	Data management
	Green architecture	Engineering management	Water energy	Clean energy	C shell csh	Commodities trading	Due diligence

Note: The figure presents the list of top 30 skills that most strongly bundle together with “Project management skills” across jobs published on line. Results are derived from the correlation of the semantic relevance of each skill with project management skills across occupations, based on the word embedding analysis detailed in Annex 5.C.

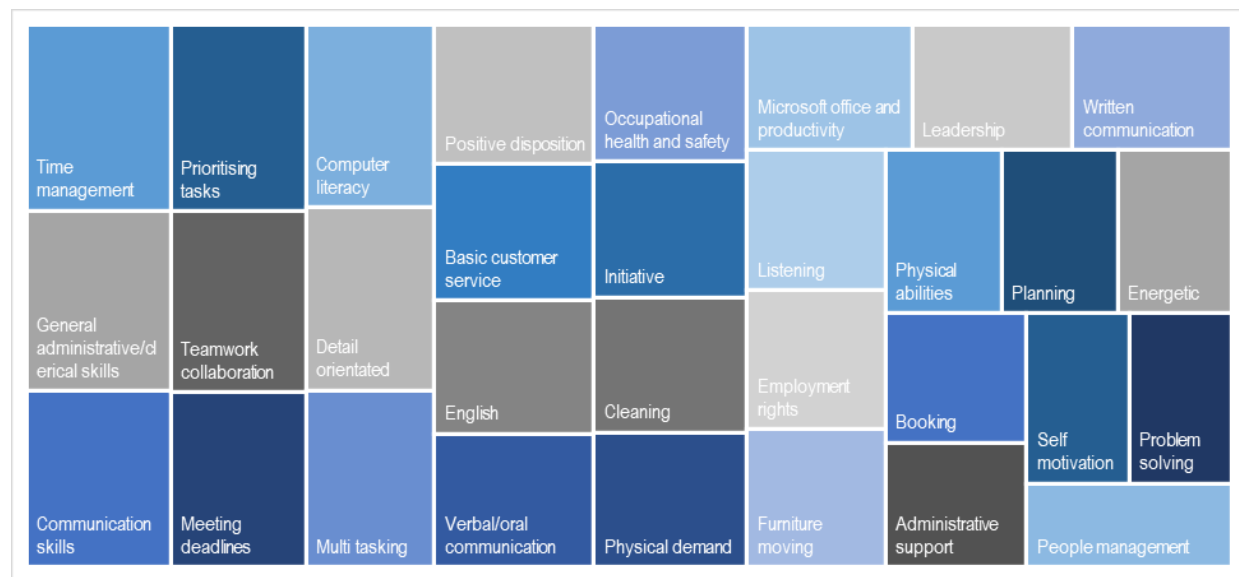
Source: OECD calculations based on Burning Glass Technologies data, May 2021.

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The skills that bundle together with organisational skills are, instead, markedly different from those in the project management skill bundle set. Figure 5.12 shows that, unlike project management skills that mostly bundle with technical skills, organisational skills are usually found in jobs that strongly relate to a large number of other transversal skills, including time management, general administrative and clerical knowledge, and basic customer service skills. This result suggests that jobs requiring high levels of organisational skills tend to bundle in a broader and more transversal skill set, reflecting their “unspecialised” nature.

Figure 5.12. Organisational skills bundle

United Kingdom, 2015-2019



Note: The figure presents the list of top 30 skills that most strongly bundle together with "Organisational skills" across jobs published on line. Results are derived from the correlation of the semantic relevance of each skill with organisational skills across occupations, based on the word embedding analysis detailed in Annex 5.C.

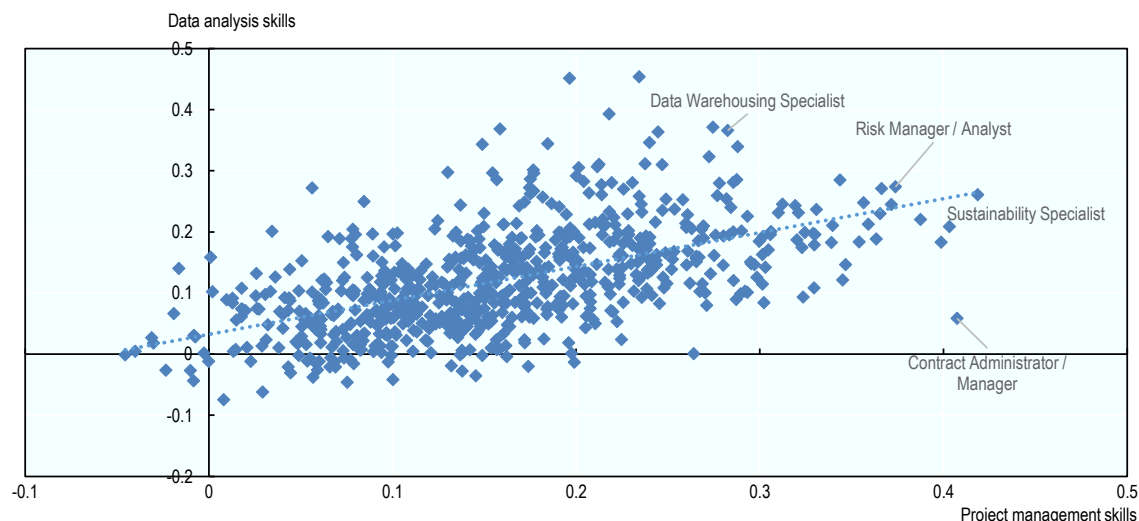
Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/ayjnz>

Results also suggest that the returns associated with transversal skills crucially depend on the work context and job in which they are used intensively. For instance, job profiles that are generally in high demand such as Risk manager analysts, Sustainability specialists or Data warehousing specialists are also occupations that rely intensively on project management or data analysis skills (Figure 5.13). Conversely, Figure 5.14 shows that organisational and communication skills are relevant in a much more diverse group of jobs, including family therapists, veterinary nurses and assistants— some of which pay low wages. Organisational and communication skills are, instead, less relevant in technical and high-paying jobs, such as mobile application developers, computer systems engineers or business intelligence architects, reflecting the overall lower returns associated to those skills.

Figure 5.13. Correlations between project management and data analysis skills by occupation

United Kingdom, 2015-2019



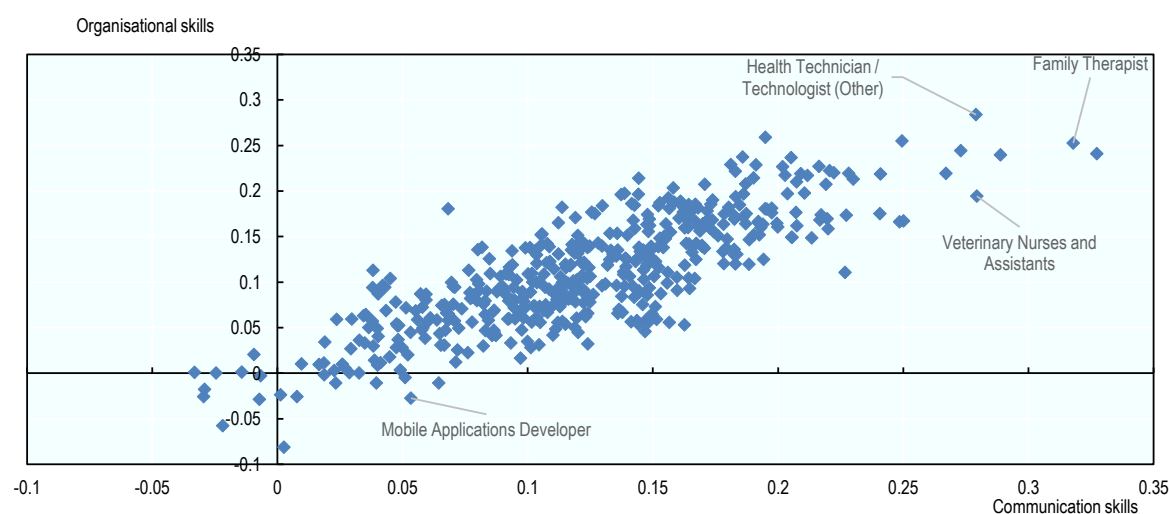
Note: The dots in the chart represent occupations whose values indicate the relevance of the relationship between the skills and the occupations. Higher values indicate a smaller distance (higher relevance) between the skill and the occupation vector representations. The results on the relevance of each skill for the occupation are derived from the analysis of the corpus of online vacancies for the United Kingdom in between 2015 and 2019, transforming textual information contained in online job postings into mathematical vectors using NLP algorithms (see details in Annex 5.C).

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/e6xwuy>

Figure 5.14. Correlations between organisational and communication skills by occupation

United Kingdom, 2015-2019



Note: The dots in the chart represent occupations whose values indicate the relevance of the relationship between the skills and the occupations. Higher values indicate a smaller distance (higher relevance) between the skill and the occupation vector representations. The results on the relevance of each skill for the occupation are derived from the analysis of the corpus of online vacancies for the United Kingdom in between 2015 and 2019, transforming textual information contained in online job postings into mathematical vectors using NLP algorithms (see details in Annex 5.C).

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/xlivqs>

Box 5.4. Communication skills: A buzzword or true demand?

Although the results in Figure 5.9 show that communication skills are associated with negative wage returns, caveats to the interpretation of these results should be considered. This result may seem puzzling at first glance, as the common narrative has stressed their importance in the labour market. Several reasons may explain the disconnect between widely reported claims about the key importance of communication skills in the labour market and the mixed empirical observations that apparently contradict this narrative. On the one hand, the analysis of online vacancies for the United Kingdom confirms that “communication skills” is by far the most common keyword in the collected data, appearing more than 1.6 million times (approximately 4% of total skill mentions – double the frequency of the second most popular skill, “basic customer service”). However, such an abundance creates measurement problems, as the inference based on this information is likely to suffer from considerable noise owing to the limited variance across occupations. In practice, if (almost) all job postings mention communication skills, those words become a noisy and imprecise indicator of the terms to which they refer. This, in turn, makes it difficult to disentangle the returns associated with communication skills.

Along these lines, Monster.com, one of the most important webpages aggregating curricula vitae (CVs) and online vacancies, recently listed “communication skills” among those “buzzwords” job seekers should avoid in their CVs, along with “hard worker” or “creative”. This is because they have become catchwords that convey little information about the candidate, the job or the tasks. Instead, curators at Monster.com suggest that candidates provide much more specific information in their resumes or CVs, describing in tangible ways how – and in what context – they have developed precise skills linked to communication or creativity. Similarly, employers looking for candidates who are able to communicate effectively should detail in their advertisements the types of communication channels or methods they expect the candidate to deploy in the job.

How can governments spur the development of transversal skills?

The results presented in previous sections show that transversal skills span a wide range of multidimensional skills, from the ability to operate digital technologies to more personal traits that are often embedded in an individual’s personality - see also Whittemore (2018^[23]). Several transversal skills are shown to enjoy positive and large returns in the labour market, and should therefore be at the core of lifelong learning systems. The key question, however, is how to best support their development. As the majority of transversal skills are not tied to any particular subject and are developed in all areas of study, innovative approaches to developing transversal skills tend to eschew input-led, subject-oriented approaches, focusing instead increasingly on specific learning outcomes. Acquiring transversal skills requires interactive and active learning. Constructivist learning theories suggest that learning through authentic activities, as opposed to solely through instruction, helps develop key competencies (Terzieva and Traina, 2015^[24]).

Spurring such involvement can be challenging, but educational programmes at all levels should consider – and wherever possible, reflect real-life applications. For instance, collaborative learning (e.g. project-based and problem-based learning approaches) allows learners to work together in small groups to achieve a common objective, and can facilitate the simultaneous development of several transversal skills. Interactive learning environments encourage learners to be active and autonomous while also collaborating with other learners and developing social and communicative competencies (Terzieva and Traina, 2015^[24]).

Training based on real-world contexts and work-based learning has also been shown to motivate learners more than traditional approaches (Lepper and Henderlong, 2000^[25]; Garris, Ahlers and Driskell, 2002^[26]) helping learners remember more easily concepts they discover on their own (De Jong and Van Joolingen, 1998^[27]) and potentially leading them to develop many of the transversal traits permeating job listings. Hence, non-formal and informal learning are therefore key channels for acquiring transversal skills, as they are usually undertaken in a work context to address real-life issues.

“Learning to learn” can help individuals at all stages of the life cycle adapt to changing social, economic and technological landscapes. Allowing learning to be more self-directed can bolster an individual’s ability to learn independently. Self-directed and flexible digital learning tools, such as micro-credentials, tutorials and web-based courses, allow individuals to learn at their own speed and become involved in topics of their choosing where they see real-life implications. This can encourage a more self-aware learning process, equipping learners with skills they can apply transversally across various contexts.

Such a varied approach to the development of transversal skills comes with a set of important challenges. To start with, education models today remain largely focused on settings where learners tend to assume a receptive position (Whittemore, 2018^[23]), teachers are trained in narrow subjects, and school schedules are organised around single subject lessons. This setting does not promote cross-fertilisation among different areas and subjects, possibly hindering the development of transversal skills at school. As high-quality teaching is key to nurturing transversal skills and competencies, higher education systems should help teachers adapt continuously to changing curricula.

Along with more traditional settings, countries should consider promoting learning environments that are not classroom-based. Interactive methods are increasingly technology-enhanced, allowing the use of innovative tools such as virtual or augmented reality. Similarly, transversal skills can be developed in an applied context, through placements, internships and study programmes (Terzieva and Traina, 2015^[24]).

Another important aspect to consider is that transversal skills should not solely permeate the training curriculum of formal initial education, nor should such training focus solely on children and young people. People of all ages should continue to develop their transversal competencies, since the world of work increasingly requires a range of transversal skills and innovative learning approaches are spread throughout an individual’s life course.

Looking into the future of labour-market and skill demands

Before the COVID-19 pandemic precipitated world economies into a crisis of unprecedented magnitude, technological change, automation and digitalisation, as well as the advent of artificial intelligence and big data, were already reshaping societies and the world of work at a breakneck speed. Updated OECD estimates project that up to 15% of existing jobs would disappear because of automation over the next 15-20 years, and that another 32% would undergo radical changes because some of the tasks originally performed by workers would be automated through new software and robots (OECD, 2019^[28]). At the same time, estimates revealed long-term increases in employment rates in most OECD countries and new job creation through technology (PwC, 2018^[29]; OECD, 2019^[28]; World Economic Forum, 2020^[8]). Since job creation and job destruction occur for different categories of workers, however, the distributional implications of technology can be profound. Some groups, such as low-skilled or older workers, are especially vulnerable to technological disruption and are ill-equipped to harness the benefits of technological change. Against this backdrop, governments are mobilising to prevent widening disparities in labour-market performance according to an individual’s age, gender and socio-economic background.

Estimates on the risk of automation suggest that even if changes in labour markets owing to COVID-19 were to be short-lived, labour markets are still poised to change dramatically in the medium and long term. Many argue that some of the changes implemented as a result of the COVID-19 crisis will remain or even

accelerate (World Economic Forum, 2020^[8]), interacting with technological innovations to produce even more substantial and rapid disruptions. In the aftermath of the pandemic, many workers who will be able to resume their jobs may still experience significant changes. Other workers may not be able to re-enter the labour market in their previous roles, and will need to retrain and upskill to find a new job. Here again, targeted and responsive lifelong learning is key to help individuals navigate this uncertain and challenging landscape.

The remainder of this section looks at the short- and medium-term outlook for labour markets. It analyses and compares the skill profiles of jobs that are projected to decline with the skill profiles of jobs that are expected to grow as a result of structural changes in the economy, automation and digitalisation. It also compares jobs that have been hit hard during the pandemic with jobs that have experienced a surge in demand. The section mines the granular information contained in online vacancies to depict precise retraining pathways that would help workers in declining occupations transition to high-quality, growing jobs that will enable them to thrive in future labour markets.

Fastest-declining and growing occupations, skill profiles and retraining pathways

Predicting the future is a challenging task. To put things into perspective, scrolling through Instagram on a mobile phone, watching a movie on Netflix or answering emails on an iPad was impossible just over a decade ago, as those technologies and platforms had not yet been invented. The technology behind 4G connections, used nowadays in virtually all mobile phones, was not yet available. Some of the largest players in the platform economy, like Uber or Airbnb, were barely more than prototypes in some countries. Similarly, online streaming platforms like Netflix or Spotify have only emerged in the last decade, and virtually all the video-conferencing technologies that have been heavily used during the COVID-19 pandemic to allow remote working did not exist.

Although it is impossible to pinpoint which technologies will be developed in the next ten years and their future impact on the lives of millions of citizens, some trends are clear. For example, when executives around the globe were surveyed to get a sense of their short- to medium-term business plans and how these would be affected by technological progress, the vast majority (84%) indicated they intended to accelerate the digitalisation of their work processes and deploy new technologies (World Economic Forum, 2020^[8]). These plans also involved expanding remote work. Approximately half of employers also reported they had plans to accelerate automation in their companies. Some 43% of the businesses surveyed believed that new technologies would reduce their workforce, but another 34% expected technologies to increase the demand for qualified labour. Despite anxieties around potential job losses owing to automation and digitalisation, most studies in this area (PwC, 2018^[29]; OECD, 2019^[28]; World Economic Forum, 2020^[8]) seem to agree that the net impact of technology on job creation will be positive, but that the distribution of gains and losses among workers in different occupations, sectors and different skill sets will be uneven. The U.S. Bureau of Labor Statistics (BLS) developed granular predictions of the impact of megatrends and structural changes on the labour market, looking at the expected impact on employment by occupation (see Box 5.5).

Box 5.5. Projections of fast growing and declining occupations

The U.S. BLS regularly publishes the National Employment Matrix which develops projected-year employment data for wage and salary jobs, including all agricultural workers and workers employed by private households. The matrix uses a conceptual framework that divides industry employment between occupations, based on expected structural changes in demand and occupations within a given industry. To project these changes in occupational demand, BLS economists examine qualitative sources such as scholarly articles, expert interviews and news stories, as well as quantitative resources such as historical data and externally produced projections. These reviews identify structural transformations in the economy that are expected to change an occupation's share of industry employment. Projected-year employment data for self-employed workers are developed similarly, but at a less-detailed level than wage and salary employment.

Source: U.S. Bureau of Labor Statistics (2020^[30]), Occupational Employment Statistics Program,, <https://www.bls.gov/emp/data/occupational-data.htm>.

Table 5.1 ranks occupations that are projected to decline the fastest between 2019 and 2029 in the United States.⁷ Word processors and typists, along with parking enforcement workers, are among the occupations that will experience the sharpest decline (over 35%) relative to their employment level in 2019. Occupations such as travel agents are projected to decline by 26%, and postmasters and mail superintendents by 22%, along with positions in very distant sectors, such as nuclear power reactor operators (-36%) and electronic equipment installers and repairers for motor vehicles (-23%). The results indicate that technological change is affecting jobs entailing different skill sets and tasks in virtually all sectors.

Some of the jobs at high risk of disruption employ a relatively small share of the total workforce (only 50 000 people worked as word processors and typists in the United States in 2019), while others employ many workers across different sectors of the economy (around 500 000 people worked as executive secretaries and executive administrative assistants in 2019).

Table 5.1. Fastest declining occupations in the United States, 2019 and projected 2029

2019 National Employment Matrix title and code	Employment		Change, 2019-29		Median annual wage, 2019
	2019	2029	Number	Percent	
Total, all occupations	162 795.6	168 834.7	6 039.2	3.7	39 810
Word processors and typists	52.7	33.5	-19.2	-36.4	40 340
Parking enforcement workers	8.1	5.2	-2.9	-36.2	40 920
Nuclear power reactor operators	5.3	3.4	-1.9	-35.7	100 530
Watch and clock repairers	3.2	2.1	-1	-32.3	42 520
Cutters and trimmers, hand	9.8	6.9	-2.9	-29.9	30 200
Telephone operators	5	3.6	-1.4	-27.9	35 750
Travel agents	82	60.8	-21.3	-25.9	40 660
Data-entry keyers	172.4	130	-42.4	-24.6	33 490
Electronic equipment installers and repairers, motor vehicles	10.4	8	-2.4	-23.2	37 380
Switchboard operators, including answering service	69.9	54.1	-15.7	-22.5	30 610
Manufactured building and mobile home installers	2.9	2.2	-0.6	-22.3	33 890
Timing device assemblers and adjusters	1.3	1	-0.3	-22.3	35 080

2019 National Employment Matrix title and code	Employment		Change, 2019-29		Median annual wage, 2019
	2019	2029	Number	Percent	
Legal secretaries and administrative assistants	171.8	133.8	-38	-22.1	47 300
Postmasters and mail superintendents	13.4	10.5	-2.9	-21.9	76 900
Forging machine setters, operators, and tenders, metal and plastic	16.4	13	-3.5	-21.1	39 670
Prepress technicians and workers	30.2	24	-6.3	-20.7	40 510
Executive secretaries and executive administrative assistants	593.4	472.4	-121.1	-20.4	60 890
Floral designers	51.8	41.4	-10.4	-20.1	28 040
Door-to-door sales workers, news and street vendors, and related workers	72.9	58.3	-14.6	-20	27 420
Grinding and polishing workers, hand	29	23.4	-5.6	-19.5	30 600
Photographic process workers and processing machine operators	12.3	9.9	-2.4	-19.4	32 280
Refractory materials repairers, except brick masons	0.8	0.7	-0.2	-19.3	53 990
Desktop publishers	10.4	8.4	-2	-19	45 390
Drilling and boring machine tool setters, operators and tenders, metal and plastic	11.2	9.1	-2.1	-19	38 910
Nuclear technicians	6.7	5.4	-1.3	-18.9	82 080
Pressers, textile, garment and related materials	38.3	31.1	-7.2	-18.9	24 190
Coil winders, tapers, and finishers	13	10.5	-2.4	-18.7	36 520
Milling and planing machine-setters, operators and tenders, metal and plastic	19.2	15.6	-3.6	-18.6	43 210
Postal service mail sorters, processors and processing-machine operators	98.5	80.9	-17.6	-17.8	60 140
Aircraft structure, surfaces, rigging and systems assemblers	43.9	36.3	-7.6	-17.4	54 210
Average for fast-declining occupations	1 656.2	1 295.5	-360.7	-22%	44 121

Note: Employment figures are expressed in thousands. Data are ranked by sharpest projected decline. Wage data cover non-farm wage and salary workers. They do not cover the self-employed, owners and partners in unincorporated firms, or household workers.
Source: Employment Projections program, U.S. BLS and OECD calculations.

StatLink  <https://stat.link/5xcby>

The information contained in the online vacancies collected in the United States provides important and unprecedentedly granular information on the most relevant skills and knowledge used by individuals in different occupations, as well as the tasks and technologies that characterise employment in each occupation, including those at a high risk of disruption. The results in Figure 5.15 show the skill bundles of word processors and typists (the occupation with the strongest projected decline between 2019 and 2029), and executive secretaries and executive administrative assistants (the largest occupation in employment size among those with the strongest projected decline between 2019 and 2029).

Word processors and typists use a wide array of skills at different levels and perform tasks in various technical knowledge areas. For instance, the results in Figure 5.15 indicate that word processors and typists are usually required to produce technical material, prepare statistical reports, plan and type statistical tables, and combine and rearrange material from different sources and require basic knowledge of trading,⁸ transaction processing, billing and legal document processing and revision.

The analysis of online vacancies also indicates that word processors and typists are required to operate a range of different technologies. Among these, Adobe PostScript is an important tool (especially in electronic publishing and desktop publishing) which was introduced in 1984, but quickly became the standard allowing proprietary systems to overcome incompatibilities between computers and printing systems. Another important tool is Sugar CRM, whose functionality includes salesforce automation, marketing campaigns, customer support and collaboration.

On a typical day of work, word processors and typists also perform a variety of more routine tasks, ranging from operating office machines; filing and storing completed documents on computer hard drives; and

maintaining a computer filing system to store, retrieve, update and delete documents. They must also gather, register and arrange the material to be typed, as well as keep records of work performed and transmit work electronically to other locations (also known as lockbox processing).

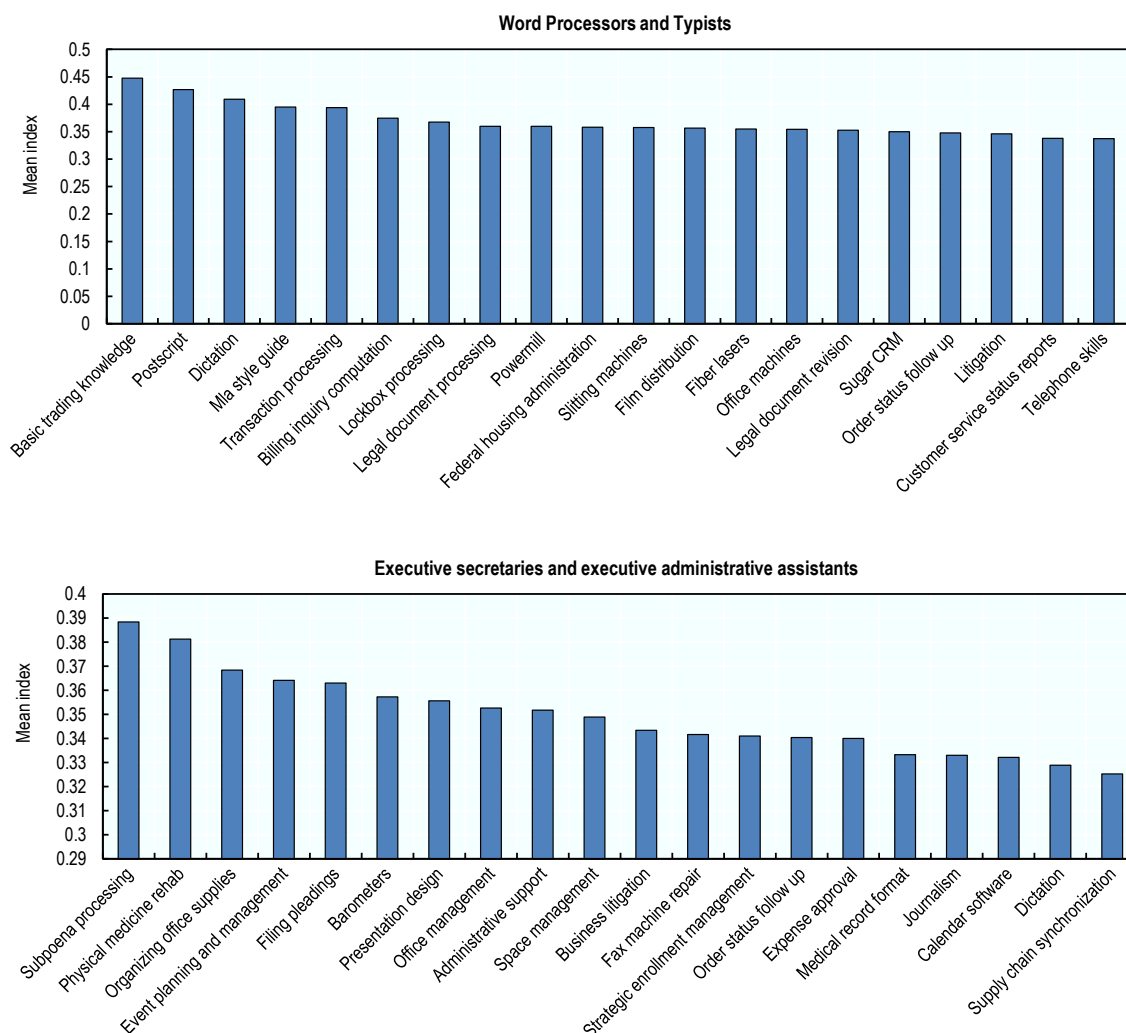
Some of these tasks face a high risk of automation. For instance, the analysis of online vacancies in the United States shows that word processors and typists are still required to take notes from dictation, operate office machines and have telephone skills. New technologies, however, will soon make those tasks and skills obsolete. Recent developments in speech recognition technologies already allow individuals to use note-taking software that is more accurate and rapid than well-trained humans taking dictation. The new Microsoft Windows operating system comes with Windows Speech Recognition, a free program that lets users control their computer and convert speech into text, and the number of similar applications (both for mobile phones and desktop computers) has increased exponentially in recent years. This is not to say that “note-taking” skills will disappear immediately. In the short term, word processors and typists will probably need to learn how to interact with machines and software programmes to “teach” them new terms and flag the most difficult words. These new technologies, however, will make many of the old tasks performed by word processors and typists redundant, very likely leading to a sharp decrease in demand.

Executive secretaries and executive administrative assistant positions are projected to decline by more than 20% in the coming decade. In the United States alone, approximately 120 000 of those jobs will be lost to technological change and structural trends, and the tasks and skill requirements of many more jobs may change substantially. As of today, information contained in online vacancies indicates that executive secretaries and executive administrative assistants combine different skills and knowledge in a variety of routine but also complex tasks. Among their higher-level tasks are knowledge of legal and/or health aspects (interagency security committee standard, subpoena processing and physical medicine rehab), which are commonly required to write technical minutes of meetings for executive managers in those fields. Typically, executive secretaries and executive administrative assistants should also be able to manage event planning, perform order status follow up and expense approval, and often file pleadings.

Executive secretaries and executive administrative assistants also perform many routine tasks that are poised to disappear or change dramatically in the near future, ranging from using calendar software to organising office supplies and even supervising the repair of fax machines. For instance, new software programs functionalities built into some of the most popular email providers (such as Gmail) already detect dates and meeting requests in emails, and schedule the calendars accordingly. Such programs also notify the user if the email contains questions or requests that have remained unanswered for more than five days.

Figure 5.15. Skill profiles of projected fast-declining occupations (selection)

Top 20 most relevant skills per occupation in the United States, 2016 to 2018



Note: Skills are ranked according to their relevance for the occupation, approximated by the semantic similarity (ranging from 1- to 1) between each skill and the lexicon used across all job postings collected for the occupation under examination. The analysis covers approximately 62 million job vacancies collected in the United States for the years 2016, 2017 and 2018. Details on the methodology can be found in Annex 5.B.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/3wthjp>

Automation and technological change will inevitably make some tasks and skills increasingly redundant – but they will also free workers' time to perform more productive activities in the same jobs or new kinds of jobs. New occupations will probably emerge in response to technological change, reshuffling skills and tasks in innovative ways. Surveys of employers (World Economic Forum, 2020^[8]) indicate that “increasingly redundant roles will decline from being 15.4% of the workforce to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents” by 2025.

According to U.S. BLS projections, employment in a wide range of jobs is expected to grow (Table 5.2), particularly among at least three main occupational categories. Occupations in the energy sector, many of which are related directly to the introduction of “green” technologies like wind turbine service technicians or solar photovoltaic installers, are set to grow by more than 50% by 2029 compared to 2019. Other jobs and tasks in the same sector are also becoming “greener”, including derrick operators, rotary drill operators and roustabouts (oil and gas), which are projected to grow by at least 25% by 2029.⁹

Employment in the healthcare sector should also increase dramatically in the next decade. Positions such as home health and personal care aides, physical therapist assistants, and medical and health services managers should grow by more than 30%, and nurse practitioners by 52%. Although these changes partly reflect the unique features of the US healthcare system, population ageing and the growing number of individuals suffering from chronic diseases are likely to spur similar changes in other countries.

Employment in the tech and data-analysis sector is also projected to grow significantly, thanks to exponential growth in data availability for commercial, research and business use. Occupations such as statisticians, information security analysts, data scientists and mathematical science occupations, software developers, and software quality-assurance analysts and testers should grow by 20-30% over the next decade. The top 30 occupations that are projected to grow the fastest will expand by 28% on average by 2029, creating more than 2.5 million new job opportunities and resulting in nearly 12 million jobs in the United States alone.

Table 5.2. Fastest-growing occupations, 2019 and projected 2029

United States

2019 National Employment Matrix title and code	Employment		Change, 2019-29		Median annual wage, 2019, USD
	2019	2029	Number	Percent	
<i>Total, all occupations</i>	162 795.6	168 834.7	6 039.2	3.7	39 810
Wind turbine service technicians	7	11.3	4.3	60.7	52 910
Nurse practitioners	211.3	322	110.7	52.4	109 820
Solar photovoltaic installers	12	18.1	6.1	50.5	44 890
Occupational therapy assistants	47.1	63.5	16.3	34.6	61 510
Statisticians	42.7	57.5	14.8	34.6	91 160
Home health and personal care aides	3 439.7	4 599.2	1 159.5	33.7	25 280
Physical therapist assistants	98.7	130.9	32.2	32.6	58 790
Medical and health services managers	422.3	555.5	133.2	31.5	100 980
Physician assistants	125.5	164.8	39.3	31.3	112 260
Information security analysts	131	171.9	40.9	31.2	99 730
Data scientists and mathematical science occupations, all other	33.2	43.4	10.3	30.9	94 280
Derrick operators, oil and gas	12	15.7	3.7	30.5	46 990
Rotary drill operators, oil and gas	20.9	26.6	5.6	26.9	54 980
Roustabouts, oil and gas	58.5	73.1	14.7	25.1	38 910
Speech-language pathologists	162.6	203.1	40.5	24.9	79 120
Operations research analysts	105.1	131.3	26.1	24.8	84 810
Substance abuse, behavioural disorder and mental health counsellors	319.4	398.4	79	24.7	46 240
Forest fire inspectors and prevention specialists	2.3	2.8	0.5	24.3	45 270
Cooks, restaurant	1 417.3	1 744.6	327.3	23.1	27 790
Animal caretakers	300.7	369.5	68.8	22.9	24 780
Service unit operators, oil and gas	51.7	63.6	11.8	22.9	46 740
Marriage and family therapists	66.2	80.9	14.8	22.3	49 610

2019 National Employment Matrix title and code	Employment		Change, 2019-29		Median annual wage, 2019, USD
	2019	2029	Number	Percent	
Computer numerically controlled tool programmers	25.7	31.3	5.6	21.9	56 450
Film and video editors	38.3	46.5	8.3	21.6	63 780
Software developers and software quality-assurance analysts and testers	1 469.2	1 785.2	316	21.5	107 510
Genetic counsellors	2.6	3.2	0.6	21.5	81 880
Physical therapist aides	50.6	61.3	10.8	21.3	27 000
Massage therapists	166.7	201.1	34.4	20.6	42 820
Health specialties teachers, post-secondary	254	306.1	52.1	20.5	97 320
Helpers -- extraction workers	16.9	20.3	3.4	20.2	37 120
Average for fast-growing occupations	9 111.2	11 702.7	2 591.5	28%	63 691

Note: Employment figures are expressed in thousands. Data are ranked by sharpest projected increase. Wage data cover non-farm wage and salary workers; they do not cover the self-employed, owners and partners in unincorporated firms, or household workers. USD= US dollars.

Source: Occupational Employment Statistics program, U.S. BLS and OECD calculations.

StatLink  <https://stat.link/bg17ek>

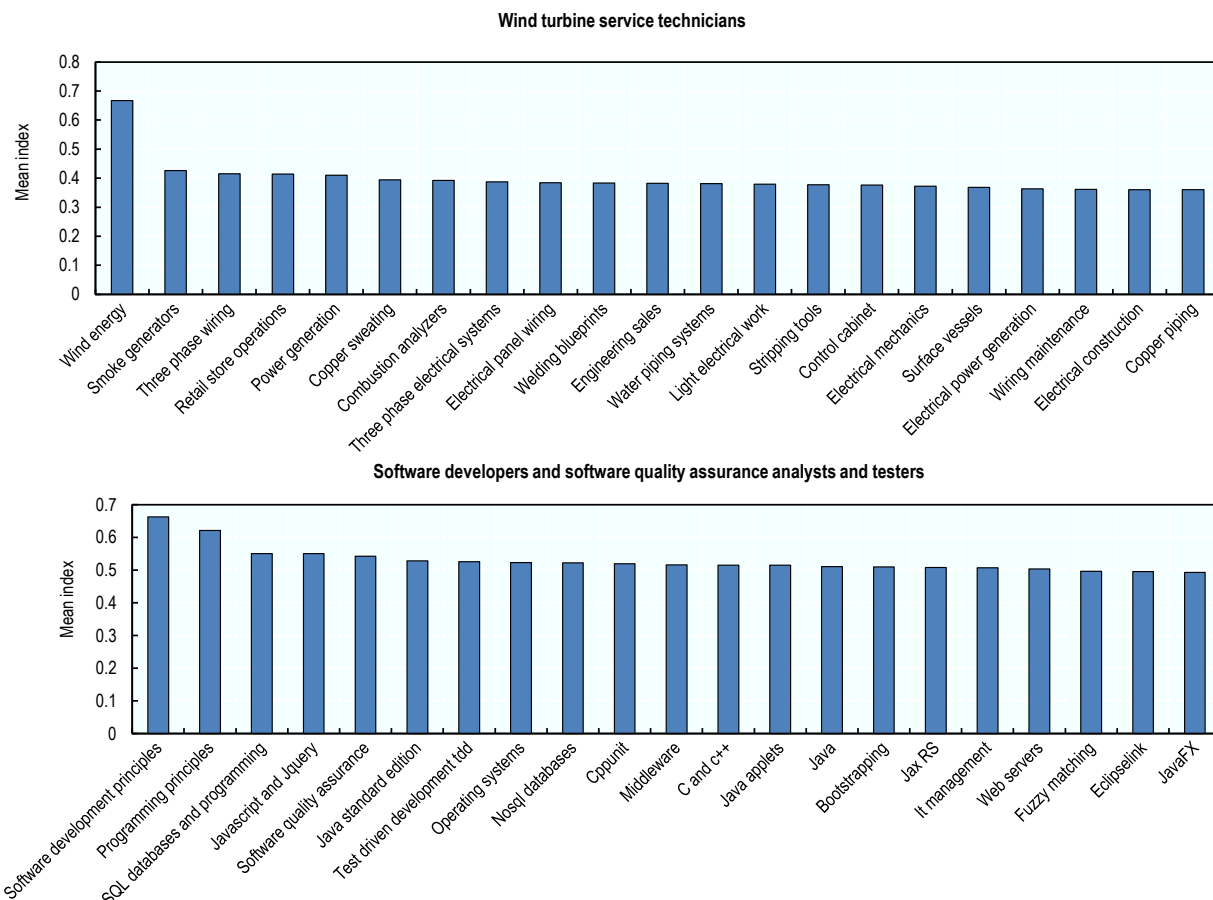
The analysis of online vacancies allows collecting granular insights about the skills and knowledge areas that are most relevant to growing occupations, as well as the tasks typically performed in these occupations. The results in Figure 5.16 emerging from the analysis of online vacancies collected between 2016 and 2018 in the United States show the skill bundle associated with wind turbine service technicians. Wind turbine service technicians are usually tasked to install, inspect, maintain, operate and repair wind turbines as well as to diagnose and fix any problem that could cause the turbine to shut down unexpectedly. Knowledge of wind energy is therefore a prerequisite for this occupation, but additional technical skills and knowledge areas are also necessary to perform this job successfully and are therefore required in related job vacancies.

For instance, wind turbine service technicians collect turbine data for testing and analysis, using smoke generators (designed to facilitate the observation of air movements and air tracing in many types of airflow situations) or operating combustion analysers. Many of the tasks associated with this job also consist in maintaining and testing electrical components, and mechanical and hydraulic systems. Knowledge of three-phase wiring and electrical systems (common tools that alternate electric power generation, transmission and distribution) are key for this occupation and highly relevant across job postings, along with copper sweating skills, knowledge of water piping systems, and the ability to read and produce welding blueprints. Interestingly, online vacancies also reveal that wind turbine service technicians are expected to be familiar with retail store operations (e.g. inventory oversight and customer service), as well as promote products, and provide technical advice and support to customers (engineering sales skills).

Software developers, and software quality-assurance analysts and testers, are job profiles that are projected to grow substantially (21%) by 2029. Those occupations require knowledge of software development principles and programming principles, SQL databases and programming, Java (a general-purpose programming language for developers) and JQuery (a free open-source JavaScript software library used by 73% of the 10 million most popular websites and designed to simplify HTML manipulation, event handling, cascading style sheets animations and Ajax). The results of the textual analysis of online vacancies indicate clearly that knowledge of programming languages (i.e. C and C++, EclipseLink and various Java applications, such as JavaFX or JavaRS) represents the lion's share of the most relevant skills for software developers and software quality-assurance analysts. However, other statistical skills, such as bootstrapping (i.e. tests or metrics using random sampling) and fuzzy matching (a technique that allows matching data records that are not 100% similar) are also key (e.g. in big-data analyses).

Figure 5.16. Skill profiles of projected fast-growing occupations (selection)

Top 20 most relevant skills per occupation in the United States, 2016 to 2018



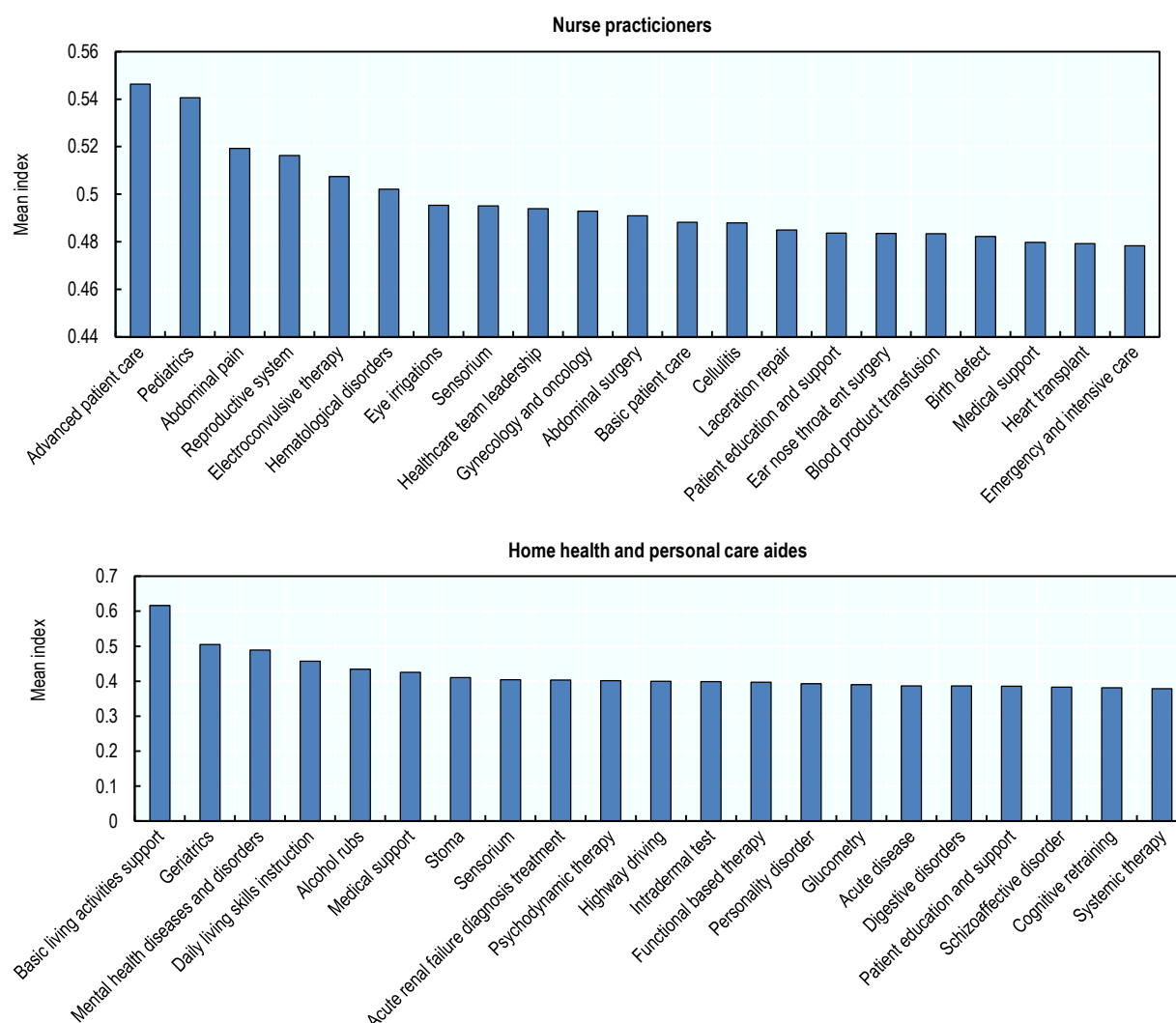
Note: Skills are ranked according to their relevance for the occupation, approximated by the semantic similarity (ranging from 1- to 1) between each skill and the lexicon used across all job postings collected for the occupation under examination. The analysis covers approximately 62 million job vacancies collected in the United States for the years 2016, 2017 and 2018. Details on the methodology can be found in Annex 5.B.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/bv2ga5>

Figure 5.17. Fast-growing healthcare occupations - skill bundles

Top 20 most relevant skills in each occupation - United States, 2016 to 2018



Note: Skills are ranked according to their relevance for the occupation, approximated by the semantic similarity (ranging from 1- to 1) between each skill and the lexicon used across all job postings collected for the occupation under examination. The analysis covers approximately 62 million job vacancies collected in the United States for the years 2016, 2017 and 2018. Details on the methodology can be found in Annex 5.B.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/brf94y>

A growing healthcare sector: Evidence on skill bundles from online vacancies

Occupations in the healthcare sector represent 13 of the 30 occupations that are projected to grow the fastest by 2029 and as such, deserve special attention. In the United States, for instance, employment for nurse practitioners is expected to double by 2029, up to 300 000 jobs. Nurse practitioners are skilled clinicians who blend clinical expertise in diagnosing and treating health conditions, with an additional emphasis on disease prevention and health management. They are trained to assess patient needs, order and interpret diagnostic and laboratory tests, diagnose diseases, and formulate and prescribe treatment

plans. According to the BLS, a nurse practitioner earns a median annual wage of more than USD 100 000, more than twice the average wage in the country. The analysis of online vacancies in Figure 5.17 indicates that the ability to provide advanced patient care is extremely relevant to the job, along with proficiency in several different medical knowledge areas such as paediatrics, gynaecology, oncology, and emergency and intensive care. Nurse practitioners blend these competencies with knowledge of therapeutic procedures such as electroconvulsive therapy, treatment of abdominal pain and its surgery, laceration repair, ear-nose-throat surgery and eye irrigations. As healthcare occupations will grow in importance in the next decade, so will the associated skills, potentially creating skill gaps that education and training systems will need to fill with adequate supply of qualified personnel.

Jobs like home and personal care aides already employ more than 3 million people in the United States and are expected to grow by an additional 34% in the next decade, eventually employing more than 4.5 million workers. Population ageing, and the associated need to support the elderly, are fundamental drivers of this labour-market dynamic. Unlike nurse practitioners, home and personal care aides are lower-skilled professionals (requiring on average a high school diploma or equivalent). However, their skills are hard to automate, given the various tasks they perform daily to assist people with disabilities, chronic illnesses or cognitive impairment in their basic living activities. Online vacancies reveal that these jobs also require familiarity with a heterogeneous set of medical concepts, such as geriatrics, mental health diseases and disorders, and acute renal failure treatment.

Interestingly, the skill bundles of home health aides and personal care aides feature innovative procedures, such as functional therapy, psychodynamic therapy (interpreting mental and emotional processes to help clients find patterns in their emotions, thoughts and beliefs, to gain insight into their current self) and even cognitive retraining. Other tasks and competencies associated with the profession involve more manual and physical abilities to support clients' living conditions, such as the ability to manipulate a stoma or perform glucometer tests or alcohol rubs.

Retraining pathways for the future: Evidence on skills and occupational mobility derived from online vacancies

The world of work is changing rapidly, and the impact of the COVID-19 pandemic will be felt for years to come as countries try to recover from this unprecedented shock. Many workers lost their jobs during the crisis, and many others saw their livelihoods decrease. Economic activity is set to restart as vaccines are made available to the general population, but uncertainty remains as to whether economies will be able to regain speed quickly and workers who have lost their jobs will be able to find new employment.

Returning to “business as usual” will not produce a sustained economic recovery (OECD, 2020^[2]), as the world of work was already changing before the pandemic. Nevertheless, the current crisis can represent a turning point to “build back better”, by tackling the emergency and the structural challenges posed by technological change, digitalisation and automation. Looking at the intersection between education, training and labour-market policy, this means that many workers will need to adapt to these turbulent times by returning to the labour market in different roles or even different occupations. These necessary transitions can only be achieved by supporting their retraining paths, so that they can develop vital new skills and competencies for today and the future.

This section mines information on the skills and knowledge areas detailed in 62 million vacancies advertised online in the United States for more than 700 different occupations between 2016 and 2018. The analysis unveils the most suitable retraining pathways that would allow individuals currently employed in occupations that are projected to decline to transition towards occupations that are projected to grow in the next decade. OECD (2019^[20]) conducted a similar exercise (though at a much higher aggregation level) based on 2012 data collected in the Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC). This chapter provides selected examples of a set of

occupations which are projected to decline sharply over the next decade or have been hard hit by the pandemic using the more granular and up to date information contained in online job postings.

In particular, as an example, this section analyses the retraining that would allow workers employed as executive assistants (occupations that are projected to decline by more than 20%) to move into occupations with a sufficient degree of skill similarity, such as administrative services and facilities managers (6% projected growth), or public relations specialists (7% projected growth).

Reflecting dynamics arising from the COVID-19 emergency, the chapter also considers the short-term retraining pathways needed to train educational, guidance and career counsellors (who experienced a 49% drop in vacancies during the crisis) to become community health workers (11% growth in online job vacancies over the same period). This is not to say that these career moves would be immediately desirable once the pandemic is brought under control but they are interesting to analyse as an example of how big-data could be used in the current context as guidance for policy makers to build short and effective retraining pathways. Of course, more and different career moves are possible and sometimes desirable, depending on individual characteristics or preferences. However, countries should consider using the real-time granular information contained in online vacancies to support the design – and especially updating – of retraining pathways and lifelong learning programmes, to support workers in their training and retraining decisions.

Retraining pathways for jobs projected to decline sharply: Evidence from online vacancies for executive secretaries and executive administrative assistants

The information contained in online vacancies makes it possible to identify the skill bundles, knowledge areas and tasks characterising different occupations. Since these characteristics may overlap, workers can make career moves by drawing on the skills and knowledge they use in their existing occupation and integrating new ones. For example, online vacancies for receptionists and information clerks share many of the same skill and knowledge requirements as file clerks, which differ vastly from those typically required of art directors or software engineers. A high degree of skill commonalities between two occupations facilitates career switching, as retraining will generally be shorter and less intense. Switching careers is also more or less difficult depending on whether the new occupation typically requires the same education level and on-the-job training to attain competence, and whether the career move implies a wage penalty or a wage increase.

The outer circle of Figure 5.18, illustrates the ten occupations whose skill bundles and knowledge areas relate most closely to those of executive secretaries and executive administrative assistants. The results are based on the information contained in online vacancies, which allows comparing the skill bundles of different occupations, ranking them from relatively dissimilar occupations to highly similar occupations in terms of skill requirements. Throughout the chart, lighter blue tones denote a closer skill similarity between the initial and destination occupation; a green colour indicates that the destination occupation is projected to grow by 2029 (see Table 5.1 and Table 5.2 above).

The inner circles of Figure 5.18, provide additional information on the typical education level (second circle from outside) and on-the-job training required to enter the job (third circle from outside). Lighter colours reflect more similar education and on-the-job training requirements between the initial and destination occupation. Finally, the innermost circle provides information as to whether a career move would imply (on average) a wage penalty, a wage increase or similar pay relative to the initial occupation (lighter colours indicate that the career move would lead to an occupation paying a higher or similar salary; darker colours lead to an occupation where the salary would be lower than in the initial occupation, hence more difficult to accept for the individual).

The results show that the “easiest” career move for executive secretaries and executive administrative assistants would be to work as first-line office supervisors and administrative support workers. In fact, the

analysis of online vacancies reveals that both occupations share similar skill, knowledge and education requirements. Neither requires particular on-the-job training, and their wages are relatively similar. However, the employment rate of first-line supervisors of office and administrative support workers is projected to decline substantially (83%) in the next decade. Given the expected impact of technological and structural changes on jobs, forward-looking career moves should consider occupations that are in the “skill neighbourhood” of the initial occupation but are projected to grow over the next decade. Administrative service and facilities managers, and public relations specialists, fall within the skill neighbourhood of executive secretaries and executive administrative assistants (as depicted in online job postings information), but are projected to grow by 6% and 7% respectively in the next decade.

Administrative services and facilities managers typically plan, direct and co-ordinate an organisation’s support services. They maintain facilities, perform administrative duties, and oversee the comfort, safety and efficiency of the built environment. Administrative services and facilities managers share various “administrative” skills with executive secretaries and executive administrative assistants, and typically engage in similar tasks. However, they also differ in a variety of aspects. Compared to executive secretaries and executive administrative assistants, administrative services and facilities managers have superior knowledge of facility management and maintenance and energy management, as well as planning, management and use of specific technologies (e.g. heating, ventilation and air conditioning [HVAC] technology) (Figure 5.19). Upskilling and training in the areas mentioned above would allow executive secretaries and executive administrative assistants to catch up on key knowledge areas required to perform the tasks of administrative services and facilities managers, while contributing many of the skills already developed in the initial occupation.

Public relations specialists typically create and maintain an employer’s or client’s public image by writing media releases, planning and directing public relations programmes, and raising funds for their organisations. Public relations specialists share various skills and knowledge areas with executive secretaries and executive administrative assistants, including the ability to plan and manage events. The two occupations differ most notably in that public relations specialists also engage in promotional campaigns, general marketing and marketing strategy. Many marketing and public relations campaigns increasingly happen on line, using social media tools such as SproutSocial (a social media management and optimisation platform that provides brands and agencies with a single hub for social media publishing, analytics and engagement across different social profiles). Executive secretaries and executive administrative assistants would generally need retraining in those areas to become public relations specialists.

Figure 5.18. Occupations in the “skill neighbourhood” of executive secretaries and executive administrative assistants

United States, 2016 to 2018



Note: Typical education needed for entry in executive secretary and executive administrative assistant occupations: high school diploma. Typical on-the-job training needed to attain competence in the occupation: none. The outer circle of the sunburst chart presents the ten occupations whose skill bundles are most similar to those of executive secretaries and executive administrative assistants. The degree of similarity is measured by applying ML algorithms (Doc2Vec) to detect closeness of skill bundles across all occupations in the information collected in 62 million vacancies in the United States between 2016 and 2018. The inner circles provide information about the typical education level associated with entering the job and the typical on-the-job training needed to attain competence in the occupation (as detailed in O*NET), as well as the median wage of each occupation relative to the initial occupation. Wage penalty is considered a career move that implies a 30% or more loss relative to the median value in 2019. Darker tones generally indicate more difficult career moves, i.e. those implying lower skill similarity, higher educational requirements, substantial on-the-job training or wage penalties compared to the initial occupation (executive secretaries and executive administrative assistants) and the destination occupation. Green colours identify occupations that are projected to grow in 2029.

Source: OECD calculations based on data from Burning Glass Technologies the BLS and ONET.


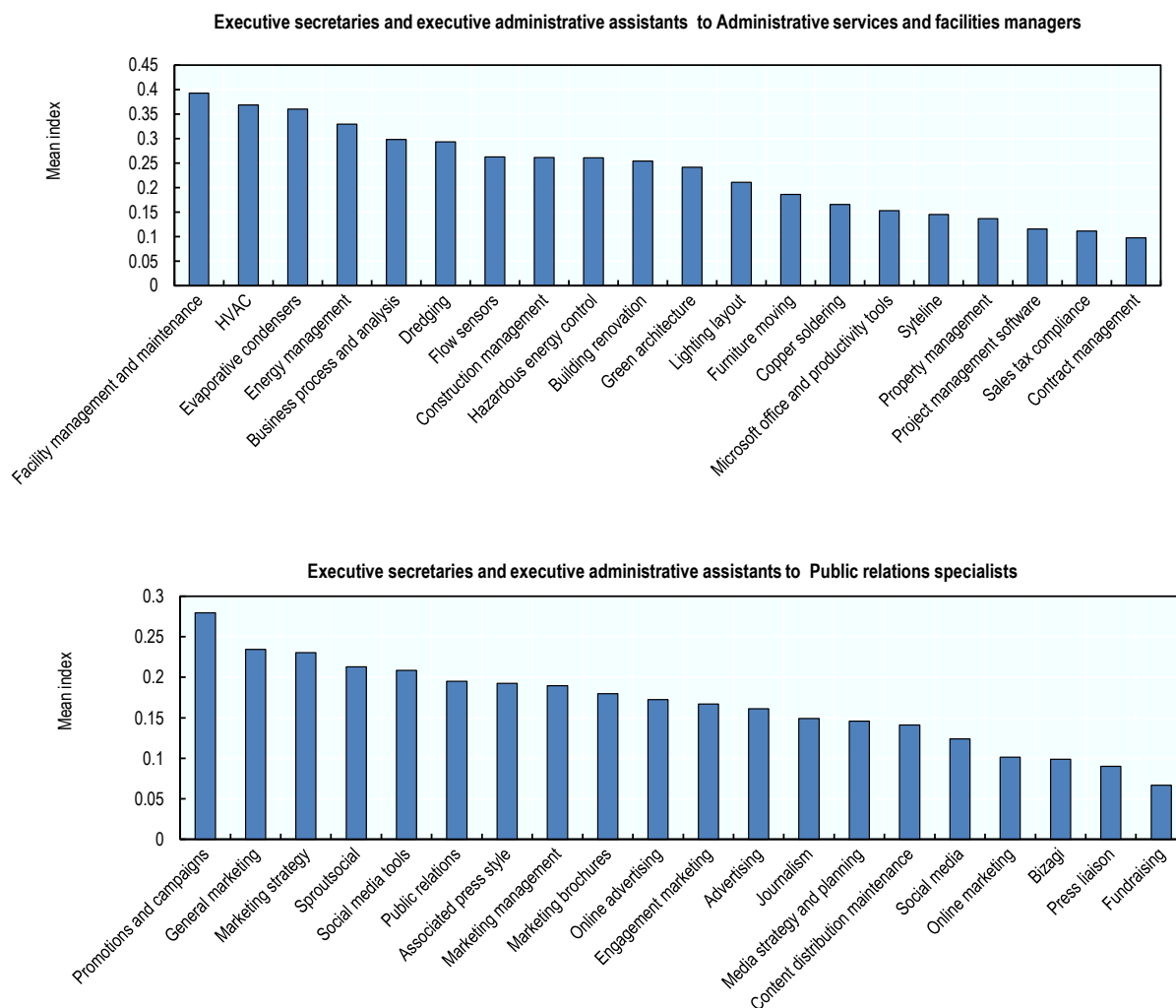
StatLink  <https://stat.link/yj74bh>

Figure 5.19. Top 20 skills executive secretaries and executive administrative assistants need to move to other occupations in their skill neighbourhood - average United States 2016 to 2018



Note: The charts present the 20 most important skills for the destination occupation, ranked by the distance between the skill profiles of the initial occupation and the destination occupation (y-axis). Positive values indicate that executive secretaries and executive administrative assistants would need to retrain/upskill in the skill under examination to move to the destination occupation in panel A or B. Conversely, negative values indicate a skill surplus. Values range from 1 (the largest possible distance between the initial and destination occupation in the skill under examination) to -1 (the largest possible negative distance between the initial and destination occupation in the skill under examination). More details on the methodology can be found in Annex 5.B.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

The COVID-19 crisis and the fast redeployment of workers through retraining pathways

The COVID-19 crisis has highlighted that the labour market can be slow in regaining its equilibrium, especially when facing a crisis of unprecedented magnitude. Personnel shortages in one part of the labour market may not be filled rapidly by surpluses of professionals in another part of the labour market, unless directed policy intervention is able to i) identify those workers who are best suited to fill those shortages; and ii) suggests quick and effective retraining pathways to fill gaps arising from the emergency.

The data contained in online vacancies can help policy makers identify workers who have experienced the sharpest declines in job openings during the crisis but who, given their skill set, would be suitable candidates to fill shortages through minor and short retraining for other occupations that have experienced surging demand. Designing skill-retraining pathways for an emergency situation is a much more complex undertaking than performing this exercise on occupations that are only slowly fading out because of technological progress. The sudden nature of the crisis makes it difficult to find suitable pairs of occupations with different labour-market prospects, but sufficiently close skill sets – not to mention other dimensions, such as educational and training requirements and wages.

The evidence in Table 5.3 identifies two such occupations in the current COVID-19 context. Data from online vacancies indicate that vacancies for educational, guidance and career counsellors have plummeted (-49%) during the pandemic, while demand for community health workers has increased by 11%. Yet these two occupations have relatively similar skill sets, which would allow redeploying from one to the other during the crisis with adequate retraining.

Table 5.3. Growing and declining occupations during the COVID-19 emergency

	Evolution of job postings during Covid-19 crisis (January-September 2020)	Median annual wage, USD, 2019	Typical education needed for entry	Work experience in a related occupation	Typical on-the-job training needed to attain competence in the occupation
Community health workers	11%	40 360	High school diploma or equivalent	None	Short-term on-the-job training
Educational, guidance and career counsellors and advisors	-49%	57 040	Master's degree	None	None

Note: Data on the evolution of online job postings during the COVID-19 crisis are calculated as the ratio between average job postings published for the occupation in January-February and the number of corresponding average job postings in September 2020.

Source: OECD calculations based on Burning Glass Technologies data and ONET (2021^[31]), O*NET online, <https://www.onetonline.org/>.

StatLink  <https://stat.link/zfrtkx>

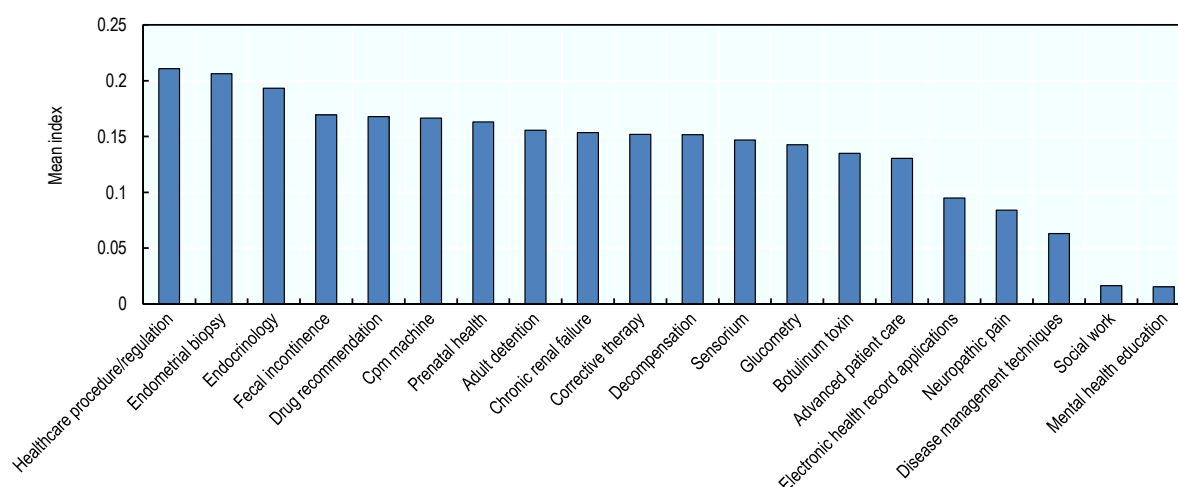
Community health workers provide and organise the delivery of basic health and medical care, and guidance to the community. Not only do they help patients navigate healthcare and social service systems and determine their eligibility for health insurance plans, they also provide informal counselling, health screenings and referrals. These tasks and skills are not far removed from those of educational, guidance and career counsellors, who also advise and assist individuals (students), and intervene when difficult situations arise in schools.

Information on skill requirements collected from online vacancies in the United States reveals that educational, guidance and career counsellors could be redeployed as community health workers through relatively minor retraining in healthcare procedures and regulations, as well as in different medical areas such as endometrial biopsy, endocrinology or drug recommendation (Figure 5.20).

Based on the granular information contained in online vacancies, a swift policy reaction could identify, in real time, which occupations are bearing the brunt of the crisis, designing short retraining pathways that will lead surplus workers to quickly fill new roles in high demand and emerging gaps in parts of the labour market affected by the emergency. However, caveats to this analysis do exist. First, the skills and knowledge areas identified in Figure 5.20 reflect the average tasks of community health workers in a pre-COVID situation, rather than those they may perform during the COVID-19 emergency. Extra care should be taken to adjust retraining paths to the current emergency situation. Second, the career moves depicted in this example should not be seen as being necessarily desirable in the longer run and once the pandemic is brought under control. In fact, educational, guidance and career counsellors, and community health workers, are both occupations that are projected to grow in the future, but that have been hit in a widely different way during the COVID-19 emergency. Going forward, however, policy makers should consider the use of such granular and timely information to closely monitor the evolution of their labour markets and adjust the supply of training and upskilling programmes accordingly.

Figure 5.20. Retraining pathways from educational, guidance and career counsellors to community health workers

United States data between 2017 and 2019



Note: The chart presents the 20 most relevant skills for the destination occupation, ranked by the distance between the skill profiles of the initial occupation and the destination occupation. Positive values indicate that retraining is needed in the skill under examination to move from the initial to the destination occupation. Conversely, negative values indicate a skill surplus. Values range from 1 (largest positive distance between the initial and destination occupation in the skill under examination) to -1 (largest negative distance between the initial and destination occupation in the skill under examination). More details about the methodology can be found in Annex 5.B.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/1sdg5c>

Conclusions

This chapter provides a glimpse into the future of skill and labour-market demands. Looking forward to the recovery from the COVID-19 crisis, many firms have already announced plans to increase productivity by investing in automation. Such investments can accelerate the disruptive effects of technology diffusion, posing important challenges to vulnerable workers, particularly individuals with low skills and poor digital skills who would need to upskill to benefit from digitalisation and technological change.

In the aftermath of the pandemic, many workers who will be able to return to their previous jobs when economic activity picks up will still experience significant evolutions in skill demands and tasks. Other – less lucky – workers may not be able to re-enter the labour market in their previous roles, and will need to retrain and upskill to find a new job with new skill requirements. Here again, targeted and responsive lifelong learning is crucial for individuals to navigate such an uncertain and challenging landscape.

Against this backdrop, countries face substantial challenges in adjusting their education and training systems to the future of work. The projections used in this chapter show that declining occupations span different sectors, and that some of the skills used by workers today will become redundant in the future as tasks are automated.

In line with evidence provided throughout the *OECD Skills Outlook 2021*, the analysis in this chapter reinforces the message that lifelong learning will become even more vital given the expected acceleration in technology uptake. Governments face great challenges in keeping their policies relevant and targeted at ever-changing landscapes and demands. To aid economic recovery in the short, medium and long term, countries must minimise skills shortages, and ensure that upskilling and reskilling efforts are targeted and timely. They must identify not only the skills needed today, but also emerging trends and those industries and sectors that will most need those skills tomorrow. This information is key to facilitate career moves and align retraining efforts with labour-market needs, supporting individuals throughout their lifelong learning journey. When merged with traditional labour-market statistics, the information contained in online vacancies can provide policy makers with timely and targeted insight on short- and long-term challenges to support crucial policy-making decisions.

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Annex 5.A. A note on using online job postings to analyse labour-market and skill demands

Millions of individuals around the globe use new technologies every day to search for a new job, stay in contact with their professional networks, or gain insights into wages and employment opportunities in their (or other) occupations. Web platforms such as LinkedIn, Monster, Indeed, ZipRecruiter or CareerBuilder aggregate the information of millions of users and firms that rely on this marketplace. Virtually all these platforms provide their users with an “electronic labour market”, where millions of new jobs in all kinds of sectors are advertised every day. Job postings (or advertisements) published on line contain textual information about the qualities employers look for in candidates, much as newspapers did in the past. The information contained in online vacancies ranges from the skills and tasks to be performed, to the advertised salary, job location, contract duration and many other aspects related to the working environment.

New advancements in automated web-scraping technologies (i.e. the automated retrieval and storage of textual information from the internet) make it possible to collect a wealth of information from online job postings to analyse trends in labour-market dynamics and skill demands with unprecedented granularity and timeliness.

The advantages of using the information contained in online job postings over traditional labour-market statistics, such as employer or labour-force surveys, lie in its richness, timeliness and granularity. First, unlike other data sources (e.g. O*NET¹⁰ or ESCO¹¹) based on the collection of survey information or expert opinions, the analysis of online vacancies allows tracking changes in skill demands over time and up until very recently. This feature of the data provides useful insights on the fast-changing labour market in the context of the COVID-19 crisis and also on evolving demand, making it possible to detect emerging trends, and predict better changes in the short and medium run.

Second, compared with existing skill databases, the detail and volume of the information contained in online vacancies significantly improves the granularity of the analysis, by enabling a close examination of specific skills that are generally grouped together in traditional data sources. This allows moving beyond the analysis of generic concepts, such as “knowledge of medicine” (assessed in other widely cited databases, such as O*NET), to more specific concepts, such as knowledge of endocrinology or anaesthesiology. This has important implications for the ability to build more granular projections of skill demands, retraining pathways and policy interventions to spur their development.

Finally, in addition to highly detailed skill-related data, online job databases contain a large range of additional metadata, including the qualifications and experience required to access a specific job, its geographical location (up to the county level), the name of the firm or employer advertising the job, the type of contract (permanent or temporary), and the type of work arrangements (i.e. whether the employee will work remotely). Many job advertisements also contain information on the salary offered.

This chapter uses information provided by Burning Glass Technologies covering 27 European countries, as well as Australia, Canada, the United Kingdom, the United States and New Zealand. The data are presented by a unique “job identifier” after a deduplication of job postings appearing in different web and career portals, ensuring that the same job is not counted more than once even if it appears in different web portals. Job postings are then mapped to different taxonomies, at the 6th digit disaggregation level of national and international classifications of occupations, which allows mapping to other employment and labour-market statistics. Burning Glass Technologies also puts considerable effort into harmonising the keywords found in the job postings. For example, words that have several accepted spellings are

considered interchangeably and codified homogeneously for further analysis. Thus, the keywords “teamwork” and “collaboration” are combined into “teamwork/collaboration”.

However, not all keywords collected from job advertisements are, strictly speaking, “skills”. Many represent “knowledge areas” (e.g. endocrinology or mathematical modelling), others identify knowledge of specific “technologies and tools” (e.g. Python or Microsoft Excel), and others yet relate to “abilities” required to perform an occupation (e.g. physical or cognitive abilities). While these distinctions are meaningful, this chapter pools these categories together in the analysis and distinguishes between the different concepts when appropriate (Box 5.A.1). For the sake of simplicity, the remainder of the chapter will use the term “skills” when referring to these different dimensions globally, while the terms “knowledge”, “abilities”, “technologies” and “tools” will be used to distinguish clearly between the different concepts.

Box 5.A.1. Knowledge, skills, abilities, technologies and tools: What is what?

“Knowledge” keywords usually refer to an organised body of information of a factual or procedural nature which, if applied, makes adequate performance on the job possible. Examples are keywords such as endocrinology which when used in a job posting, denotes the required knowledge of all aspects related to the medical discipline and to the associated body of information.

“Skill” keywords refer to the proficient manual, verbal or mental manipulation of data or things. Skills can be readily measured by a performance test where quantity and quality of performance are evaluated, usually within an established time limit. Examples of proficient manipulation of things are skill in typing or skill in operating a vehicle. Examples of proficient manipulation of data are skill in computation using decimals and skill in editing for transposed numbers.

“Ability” keywords refer to the power to perform an observable activity at the present time. This means that abilities have been evidenced through activities or behaviours that are similar to those required on the job (e.g. the ability to plan and organise work).

“Technology” and “tool” keywords refer to the knowledge of and ability to utilise certain technologies in a work context. Keywords such as Python, for instance, refer to the required knowledge of that software programming language which can be applied to tasks in different occupations. Similarly, keywords such as Excel reference the ability to use that statistical software package in a work-setting.

Going ahead, more work is planned to clarify the distinctions among these dimensions in keywords collected from online vacancies in order to further enrich the analysis.

Source: Adapted from OECD (2017_[32]), “*Getting Skills Right: Skills for Jobs Indicators*”, <https://dx.doi.org/10.1787/9789264277878-en>.

The wealth and granularity of skill and labour-market information contained in online vacancies is unprecedented, but caveats and limitations to the use of these data also exist. For instance, Burning Glass data only cover jobs posted on line and may therefore not be representative of overall vacancies advertised offline.¹² In addition, online vacancies can be somewhat skewed towards certain areas of the economy. (Hershbein and Kahn, 2018_[33]) document that healthcare and social assistance, finance and insurance, and education are overrepresented in Burning Glass data for the United States, while accommodation and food services, public administration/government and construction are underrepresented. However, most differences are small in magnitude. A recent OECD working paper assessed the statistical properties and distributional characteristics of online job posting data from Burning Glass, and how these changed over time (Cammeerat and Squicciarini, 2020_[34]). This work suggests that most countries display adequate representativeness overall, when considering only those years for which no breaks in time series are observed. However, the study shows that occupational categories such as managers, professionals, and technicians and associated professionals are relatively more represented in Burning Glass data compared

to other occupational categories. Caution should therefore be exercised when interpreting the results and comparing occupational categories or performing sectoral analyses.¹³

The potential bias is more pronounced for low-skilled jobs, and less of a concern for high-skilled occupations and sectors. In this regard, Carnevale, Jayasundera and Repnikov (2014^[35]) estimate that around 80-90% of postings requiring at least a bachelor's degree are found on line, compared to 40-60% of job postings requiring a high school degree. That being said, Hershbein and Kahn (2018^[33]), Forsythe et al (2020^[36]) and Dalton, Kahn and Mueller (2020^[8]) have linked Burning Glass data in the United States to the U.S. Job Openings and Labor Turnover Survey at the establishment level, finding a high degree of consistency between the two data sets.¹⁴ Knutsson, Tsvetkova and Lembck (forthcoming^[37]) also show that the regional distribution of Burning Glass data for Australia, Canada and the United States is generally well aligned with official data for the most recent years.

Annex 5.B. A note on the machine learning approach to the analysis of skill information contained in online job postings

Previous literature that used online vacancies to analyse labour market dynamics has, in most cases, counted the frequency with which skill keywords appear in job postings and used it to make inference about skill demands in the labour market. Recent developments in Natural Language Processing (NLP), however, allow to leverage the information contained in online vacancies in a much more sophisticated way by looking at the semantic meaning of the textual information contained in online job postings. One such approach, the so-called word embeddings, derives a word's meaning from the context this occurs in (the distributional hypothesis). This approach is used in this chapter to both interpret the semantics of the keywords in the database as well as to come up with a strategy to categorise them into larger groups.

In their most common form, vector space models use the word's context to derive the meaning of a word and create n -dimensional vectors to represent that meaning. In essence, these n -dimensional vectors are lists of real valued numbers that may be plotted as coordinates in a high-dimensional space. This semantic representation is thus encoded and distributed over all the n dimensions of the vector, where each dimension stands for a certain context item and its coordinates refer to the count of this context (Erk, 2012^[17]). Since this semantic representation is entirely built from real valued numbers, one can use similarity measures to reflect the similarity between different vectors representing different words (Boleda, 2020^[38]).

Intuitively these arithmetic operations are retaining the semantic meaning of words and the results of such mathematical operations are, therefore, expected to return semantically and logically meaningful results. For instance, once word vectors have been estimated, one could perform basic arithmetic, such as: $vec(\text{"Queen"}) + vec(\text{"Male"}) = vec(\text{"King"})$.

From a mathematical point of view, this means that if two words share a similar meaning (for example Queen, King and Royalty) the cosine of the angle between their vector representations should be close to 1, i.e. the angle close to 0. Furthermore, negative values for the cosine refer to vector representations similar, but opposite in meaning. In the context of online job postings used in this chapter, this can be used to extract the semantic meaning of each "skill keyword" contained and analyse them by drawing the relationships between, in our case, skill keywords.

In addition to word-vectors (representing skills), the vector representation of all occupations is also derived, using the concatenation of the skill vectors to form 'occupation vectors'. To facilitate this, the paragraph vector distributed bag of words (PV-DBOW) is used to determine the semantic meaning of both skills and occupations. Individual skill vectors were trained with the Skip-Gram variant of the Word2Vec package. The occupation vectors, empirically obtained using PV-DBOW, intuitively, represent the semantics of each occupation in a vector-form as they are constructed from the meaning of the skills that form the occupation, representing the skill requirements of a certain occupation.

Having calculated the vector representation in the n -dimensional space of both the skill and occupation keywords allows also to calculate the similarity of any given skill with every occupation vector calculated. This allows to assess, for instance, whether the vector for the keyword "Administration skills" is closer to the vector representation of the occupation "Economist" or to that of a "Painter". Note that the extracted skill graph forms an undirected acyclic graph, meaning that skills do not co-occur with themselves. As a result, the diagonal of the adjacency matrix is 0. Whenever a skill co-occurs with another skill in a certain

job vacancy, the row corresponding to the skill “A”, and the column corresponding to the skill “B” will get the value 1. Note that the adjacency matrix is symmetric, meaning that the co-occurrence between skills is undirected and therefore commutative.

The similarity scores between each skill keywords and the occupation-vectors are calculated for all combinations of occupations and skills and the resulting values populate the Semantic Skill Bundle Matrix (SSBM henceforth).

Annex Box 5.B.1. Interpreting the semantics contained in online vacancies

The core objective of a language model is to understand the complex relationships between words (the semantic context) in order to predict the most adequate word (the output) in multifaceted situations such as translation, question answering and sentiment analysis.

When applied to the context of language and semantic analysis, *language models* aim to learn from the data the probability distribution related to a sequence of words so as to be able to either predict the words that should be following the one under exam or to assign probabilities to the likelihood of certain sentences to happen given the contextual information.

Word embeddings function by creating a mapping between words and their meaning (i.e. semantics) in so-called word vectors. These word vectors are, in practice, the mathematical representation of the semantic meaning of the words in a n -dimensional vector space where words with similar meanings occupy close spatial and mathematical positions in the vector space. Based on their meaning, for instance, the word ‘Queen’ and ‘King’ are likely to have similar word vectors and to be close in the mathematical vector space as they are also semantically related even if the letters of the alphabet that they are comprised of are totally different.

From an empirical point of view, estimating word vectors requires “fitting the data” or the “corpus” (i.e. the collection of all words to be analysed, in this case, the text of millions job postings) by solving an optimization problem. In particular, the ‘semantic analysis’ relies on the identification of the key text elements in the corpus (i.e. the set of all sentences) and the assignment of those elements to their logical and grammatical role in the semantic context.

To illustrate the type of information contained in the SSBM, an example is given in Annex Figure 5.B.1 for the occupations “Web-Designer” and “Marketing Manager”. Results in Annex Figure 5.B.1 show that the word vectors “Web Design”, “Bootstrap” and “Graphic and Visual Design” are semantically (spatially) close to the occupation “Web Designer” and, hence, are interpreted in what follows as the “relevant” skills to that occupation. Similarly, “Online Marketing”, “Marketing Management” and “General Marketing” are the relevant skills for “Marketing Managers”.

Annex Table 5.B.1. Example of skill bundle (selected top and bottom skills)

United Kingdom, 2018

Web Designer		Marketing Manager	
Web Design	0.73	Online Marketing	0.57
Bootstrap	0.62	Marketing Management	0.52
Graphic And Visual Design	0.55	General Marketing	0.52
User Interface And User Experience	0.55	Marketing Strategy	0.50
Digital Design	0.55	Web Analytics	0.49
Javascript And JQuery	0.55	Media Strategy And Planning	0.47
Animation And Game Design	0.53	Content Development And Management	0.45
...		...	

Web Designer		Marketing Manager	
Electrical Engineering Industry	-0.06	Civil Aviation Authority	-0.04
Occupational Hygiene	-0.06	Fuel Meters	-0.04
Oil Well Intervention	-0.06	Diagnostic Technologies	-0.04
Oil Wells	-0.06	Repair	-0.06
Mechanical Products Industry Knowledge	-0.08	Thermoplastic	-0.07
Health Care Industry Knowledge	-0.11	Radio Frequency Equipment	-0.08

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

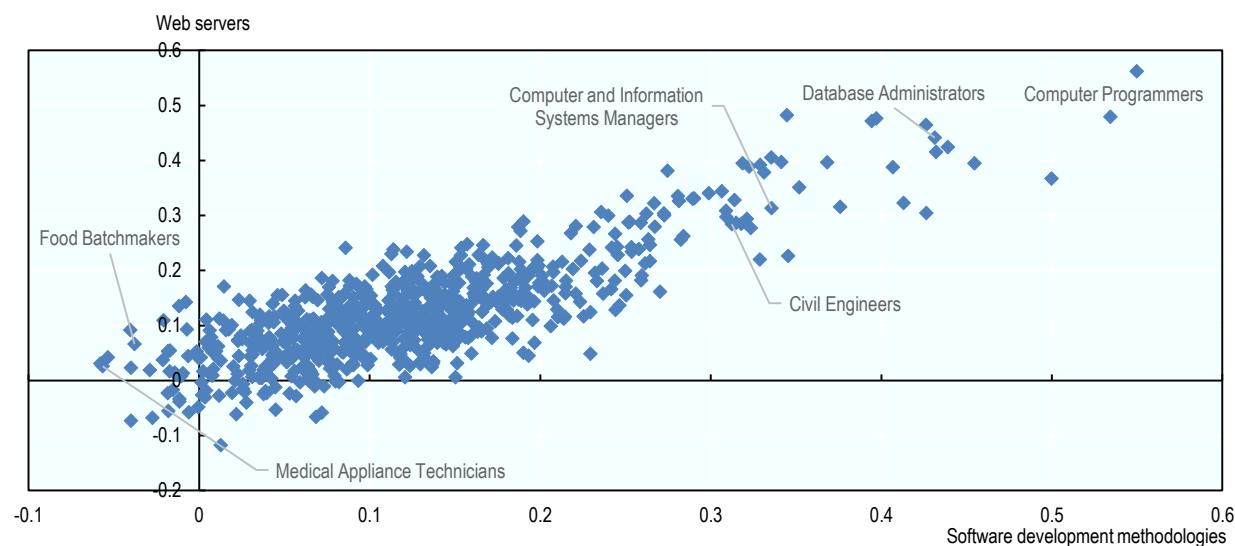
StatLink  <https://stat.link/v78i5y>

In addition to creating a series of ranked values of the relevance of each skill for any given occupation, the structure of the SSBM allows to calculate the correlation between skills in BGT across the occupations. In practice, it is possible to know the extent of the correlation between each skill, unveiling the relationship between skills in the full body of online vacancies.

To exemplify this, Annex Figure 5.B.1 shows how the knowledge of ‘Software development methodology’ is associated to that of ‘Web servers’ across occupations, meaning that occupations where the former keyword is highly relevant are those where the latter is also relevant.


Annex Figure 5.B.1. Correlation between the knowledge of “Software development methodology” and that of “Web Servers” across occupations

United Kingdom, 2018



Note: Dots represent occupations, 703 in total in the United Kingdom, 2018. Correlation coefficient 0.82. The values on the axes come from the skill bundles matrix (e.g. the semantic distance of each of the two skills from the occupations analysed).

Source: OECD calculations based on Burning Glass Technology data, May 2021.

StatLink  <https://stat.link/92pqet>

Annex Box 5.B.2. Applications of the Semantic Skill Bundle Matrix

Several applications are possible by exploiting the correlation matrix extracted from the skill bundles. First, one can explore what skills are more likely to appear together (on average across all occupations in the labour market). This could be useful to suggest an individual areas where she/he could potentially need to develop further (new) skills (if not already mastered) as the suggested skills are close matches to her/his own and are likely to be demanded in jobs of potential interest for the individual. For instance, results show that, on average, occupations requiring high levels of both “cloud solutions” and “database administration” skills are also highly correlated to “data warehousing” skills. A job-seeker with the first two skills, therefore, may want to consider developing the third, as this is likely to be in high demand in occupations related to her/his area of expertise.


Second, correlation analysis can also help to infer the relationship between key skills such as “artificial intelligence” and other complementary skills to it. Results show, for instance, that jobs requiring high levels of “artificial intelligence” skills are also very likely to require “machine learning” and “data science” as well as “big data” and others.

Annex Table 5.B.2. Correlation between Artificial Intelligence and other skills in the database

United Kingdom, 2018

Skills	Correlation With Artificial Intelligence
Machine Learning	0.86
Data Science	0.80
Big Data	0.78
Scripting Languages	0.77
Tensorflow	0.74
Internet Of Things (IoT)	0.73
Caffe Deep Learning Framework	0.73
Software Development Principles	0.72

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/0j5mo7>

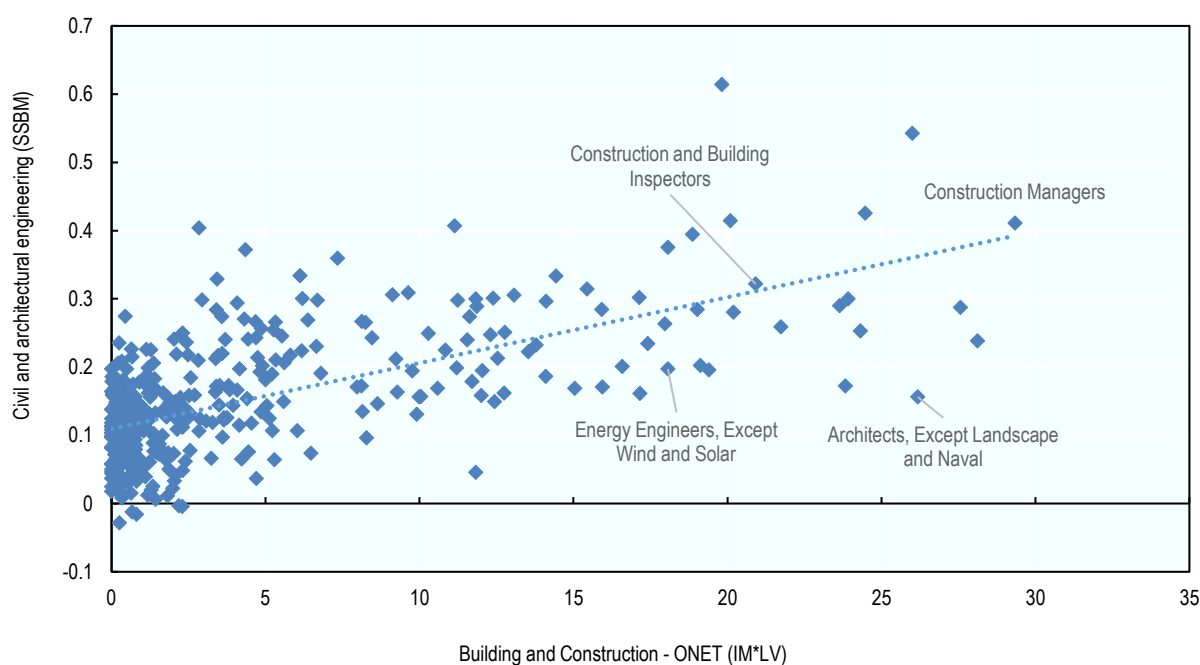
The values in the skills bundle matrix are built as a representation of the semantic similarity/dissimilarity of any given skill keyword relative to each occupation’s vector representation. From an intuitive point of view, the closer (semantically, in meaning, that is also in the n -dimensional vector space) a skill keyword is to an occupation and the more this skill plays an important role for that occupation (i.e. it is ‘relevant’ to it). In principle, the semantic similarity of a skill to an occupation can, therefore, be used to proxy for the importance of that skill in the specific skill bundle of the occupation under consideration. There are, however, no straightforward ways of empirically testing this hypothesis. One possibility is to use expert judgement and assessments about the importance of skill across occupations and compare that to the values of the skill bundle matrix.

ONET is a precious source of information in these regards as it provides a “concise index” of experts’ assessment of the importance and level of a wide range of skills across occupations. In ONET, experts and job incumbents are asked to rank the importance (and level) of a wide range of skills for each occupation (up to 6 digits) in the U.S. labour market.

By correlating the values of the skill bundle matrix with those in ONET across occupations, one is ideally able to establish whether the skill bundle's values built using the semantics analysis are a good approximation of the “importance and level” ranking given by ONET experts to each skill across occupations. One challenge is, however, that BGT's skill keywords differ from ONET's categories. As BGT keywords are much more numerous, they are also more granular and specific than the categories in ONET. As an example, while in BGT it is possible to find the keyword “Anaesthesiology”, in ONET such skill would likely be categorised into a much more general label such as “Medicine and Dentistry”.

Running a full correlation analysis between any given BGT skill and all ONET categories' values across occupations allows identifying the relationships between ONET categories and BGT keywords. Results in Annex Figure 5.B.2, show the correlation (coeff: 0.66) between the SSBM's values for Civil and Architectural Engineering (BGT) with Building and Construction knowledge (ONET). This correlation is positive and significant, confirming that ONET and SSBM's values are well aligned as expected/desired.

Annex Figure 5.B.2. Correlation between Civil and architectural engineering semantic skill bundle's (SSBM) values and Building and Construction knowledge across occupations in ONET (importance*level)



Note: The correlation coefficient between ONET values (computed as the product of the importance and level scores, IM*LV) and SSBM values is 0.65. Dots are ONET and SSBM values for occupations (6-digit US SOC).

Source: OECD calculations based on Burning Glass Technology data and ONET (2021_[31]), O*NET online, <https://www.onetonline.org/>.

StatLink  <https://stat.link/kh1fj0>

The results above confirm that the ranking of semantic ‘relevance’ of skills across occupations in the SSBM resembles the ranking of the importance and level in ONET (as provided by labour market experts and job incumbents) for skills/knowledge areas that are logically related to each other across the two data sources (i.e. in the cases above Anaesthesiology vs Medicine and Dentistry or Civil engineering vs Building and Construction in BGT and ONET respectively). In turn, this suggests that the values contained in the SSBM and their ranking across occupations can be used to proxy for the relevance of BGT skills across occupations as they produce strikingly similar results when compared to ONET values over the same occupations and in related skills, knowledge and abilities.

Annex 5.C. A note on the empirical assessment of the impact of transversal skills on wages and job openings

The analysis presented in the chapter estimates the association between wages, employment outcomes and transversal skills through a standard regression model run on a large panel of approximately 2 million online vacancies collected in the United Kingdom in between 2017 and 2019. The empirical model tests the following general specification in two variants (wage and employment):

$$\ln Y = \alpha + \beta_1 \text{AvEducation} + \beta_2 \text{SkillComplex} + \beta_3 \text{Trans_Skill} + \text{Geography} + \text{Sector} + \text{Time}$$

In the wage regression, $\ln Y$ is the log of yearly wages offered in each individual job posting. In the employment regression, $\ln Y$ represents instead the log of job openings in the specific occupation at the 6-digit level of the ISCO. Both specifications use the same set of regressors to estimate the returns on wages and employment. However, the employment regression aggregates all variables at the occupation level (6-digit) as the dependent variable in this latter specification is the frequency of job openings by occupation and geography.

AvEducation is the qualification title mentioned by employers in their advertisements. As job postings do not explicitly mention the number of years of education required, but instead only the desired qualification level (e.g. master's degree, doctorate or upper-secondary education), the title has been converted into average years of education using the standard International Standard Classification of Education.

SkillComplex measures the total number of skills mentioned in each job advertisement and is an indicator of the average skill complexity of the job opening under consideration. Jobs mentioning a larger number of skills are assumed to be more complex, requiring multifaceted combinations of skills.

Trans_Skills is a continuous variable that captures the relevance of each transversal skill under consideration for any given occupation. This measure is calculated by creating word embeddings of the textual information contained in online vacancies (see Annex 5.B), which allow representing the semantic meaning of keywords in mathematical vector form. Both skill and occupation vectors have been estimated through NLP and the use of word2vec and doc2vec ML algorithms. The semantic distance (i.e. cosine similarity) between skill and occupation vectors is used to approximate the relevance of the skill to the occupation. For instance, this ML approach makes it possible to disentangle whether leadership skills are closer and more relevant to managers than to plumbers. The empirical specification is run on a full set of sector and geography dummies (county level) as well as time fixed effects, and is repeated separately for each transversal skill in Figure 5.8.

In addition to the results presented in the main text above which look at the returns of each specific transversal skill, further analysis in Annex Table 5.C.1 investigates whether jobs that require a larger number of transversal skills receive higher or lower wage or employment returns. Results in Annex Table 5.C.1 show that, on average, job postings mentioning a large number of transversal skills are associated with negative wage returns (i.e. with wages that are below the average of the sample). The result is not unexpected. Jobs requiring a relatively large number of transversal skills are not, by definition, technical and specialised jobs and this is likely to lead to lower than average wage returns in the broad labour market. To put it in other words, results suggest that a certain degree of specialisation and of technical skills drives positive wage premium. That being said, results in Annex Table 5.C.1 also show that occupations requiring a relatively large number of transversal skills enjoy positive employment returns

(i.e. more job openings than average). The results suggest that workers who master many different transversal skills can easily adapt to different job roles and perform tasks in a variety of occupations. To put it in other words, individuals mastering a large set of transversal skills are likely to be good candidates for a wider set of jobs, increasing significantly one's overall chances of being employed. Taking both wage and employment results together, the analysis in Annex Table 5.C.1 suggests the existence of a trade-off between what transversal skills can deliver in terms of an increased employability and the wage returns associated with them.

Annex Table 5.C.1. Average association between transversal skills intensity, wages and job openings

United Kingdom, 2017-2019

	Log (wage)	Log(openings)
Years of education	0.09***	-0.01***
Skill complexity	0.02***	-0.01
Transversal skills intensity	-0.02***	0.03***
Constant	8.94***	3.33***
Multiple R-squared	0.29	0.24
Adjusted R-squared	0.29	0.23
Observations	2289267	184943

Note: Results present coefficients of OLS regressions run on the number of years of education, skill complexity (i.e. the number of skills mentioned in each job posting) as well as on transversal skill intensity (i.e. the number of transversal skills mentioned in each job posting). Time and geography dummies are also added to each regression to control for unobserved heterogeneity. *** indicate that coefficients are statistically significant at 1% confidence levels.

Source: OECD calculations based on Burning Glass Technologies data, May 2021.

StatLink  <https://stat.link/5be7pm>

Notes

¹ Initiatives ranged from stronger efforts to detect cases early and trace contacts with other people to ordering severe physical distancing measures, including full national lockdowns and economic shutdowns, except for “essential activities”. Common measures included school closings, travel restrictions, bans on public gatherings, emergency investments in healthcare facilities, new forms of social welfare provision, contact tracing, and other interventions to contain the spread of the virus, reinforce health systems and manage the economic consequences of these actions (Hale et al., 2020^[41]).

² The results presented here concern selected countries. The results for the full set of countries will be made available in online country notes.

³ The stringency index is taken from the Oxford COVID-19 Government Response Tracker (OxCGRT), a systematic tool to track government responses to COVID-19 over time across countries and subnational jurisdictions. The project tracks governments’ policies and interventions across a standardised series of indicators, and creates a suite of composites indices to measure the extent of these responses. The stringency index in particular contains information on containment and closure policies, such as school closures and movement restrictions. It records the number and strictness of government policies, and should not be interpreted as “scoring” the appropriateness or effectiveness of a country’s response. For more information, see (University of Oxford, 2021^[41]).

⁴ Caveats apply to the interpretation of these disaggregated results. It should be noted that although the results are based on large samples of observations, job postings that explicitly state the minimum educational requirements make up a smaller share of the total vacancies: 32.3% of the full sample for the Australian sample, 38% for Canada, 25.6% for the United Kingdom and 60.5% for the United States. It should also be noted that low-skilled occupations are not widely advertised on line and may therefore be underreported in this analysis.

⁵ This section analyses online vacancies published in the United Kingdom between 2017 and 2019. It uses the results for the United Kingdom as an example, since the transversal skills identified in other countries are qualitatively similar.

⁶ Among the IT skills related to project management there are C shell-csh (a programming language that resembles C and that let users recall previous commands they have entered and either repeat them or edit these commands) and IPX/SPX (a network layer protocol).

⁷ This chapter uses projections for the United States to illustrate the expected effects of megatrends (e.g. automation, digitalisation and population ageing) on economies that are at the technological frontier. The trends analysed here are therefore likely to be qualitatively similar and predictable in other countries. Moreover, the projections used here are produced at a high occupational disaggregation level, which allows capturing the effects of megatrends on employment trends with the necessary granularity for this analysis.

⁸ Knowledge of trading relates to operations that consist of buying and selling a financial instrument within the same day, or even multiple times during the same day

⁹ Previous studies by Vona et al. (2018^[44]) and Chen et al. (2020^[40]) used O*NET data to identify core sets of green skills, finding that the importance of green skills for Derrick operators is close to the maximum indicator.

¹⁰ (ONET, 2021_[31]).

¹¹ (ESCO, 2021_[42]).

¹² It should be noted that available jobs have been appearing increasingly on line, rather than in traditional sources (such as newspapers). For instance, an estimated 60-70% of all job postings in the United States could be found on line in 2014 (Carnevale, Jayasundera and Repnikov, 2014_[35]).

¹³ Depending on the aim of the study, reweighting the sample may be necessary. Moreover, the study shows concerns over representativeness of the data of Australia and New Zealand. Hershbein and Kahn (2020_[39]) propose a reweighting-estimation-transformation approach to estimate the impacts of COVID-19 on job postings in Australia and overcome the problem related to the small sample size. Given the nature of the data and the scarcity of traditional statistics with similar frequencies, reweighting the data can be difficult. The results in this brief should therefore be interpreted carefully.

¹⁴ Another point raised by Hershbein and Kahn (2018_[33]) is that online vacancies “represent just one margin by which firms may adjust labour inputs through stated, but not necessarily realized, demand”.

OECD Skills Outlook 2021

LEARNING FOR LIFE

Lifelong learning is key if individuals are to succeed in labour markets and societies shaped by megatrends such as increases in life expectancy, rapid technological changes, globalisation, migration, environmental changes and digitalisation, as well as sudden shocks like the COVID-19 pandemic. In a fast-changing and uncertain world, lifelong learning can help individuals adapt and become resilient to external shocks. While government support remains valuable to ensure that major structural changes do not lead to deep tears in the social fabric, creating a culture of lifelong learning gives individuals themselves agency to manage change. This calls for evidence on the best ways to support lifelong learning journeys, so that individuals can “learn how to learn”. This edition of the *OECD Skills Outlook 2021* explores how policies, particularly those that govern skills development and use, can best promote lifelong learning for all. The report exploits comparative quantitative data to highlight the key role played by socio-emotional and motivational factors in shaping successful engagement with lifelong learning. While such factors are essential to sustain lifelong learning in general, the pandemic has further increased their relevance.



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