

Why are indicators on skills in the digital era needed?

The digital transformation creates two major challenges for national skills development systems. First, despite growing awareness that the skills profile of citizens and workers in the future will be very different from that of the past, identifying essential skills with certainty is difficult due to rapid technological change. Once these skills have been identified, the second challenge is to ensure that skills development systems adjust sufficiently fast to match the demand for new skills.

Indicators for skills in the digital era are key to addressing both challenges: identifying new demand for skills and monitoring the output of skills development systems.

What are the challenges?

Digital transformation is increasing demand for new skills along three lines. First, the production of ICT products and services – software, webpages, e-commerce, cloud-based computing, Big data and so on – requires ICT specialist skills to program, develop applications and manage networks. Second, workers across a wide-range of occupations need to acquire generic ICT skills to be able to use such technologies in their daily work (e.g. access information online, use software, etc.). Finally, the use of ICTs is changing the way in which work is carried out and increasing demand for ICT-complementary skills (e.g. the capability to compile and analyse information, communicate on social networks, brand products on e-commerce platforms, and so on).

Automation and changes to the way in which work is organised are also likely to significantly affect the relevant skill mix of workers (OECD, 2016a). Automation is altering the distribution of tasks between humans and machines. Robots tend to be skill-biased – they complement skilled workers and substitute for unskilled ones (Autor, 2015; Nedelkoska and Quintini, 2018; OECD, forthcoming). In addition, digital technologies are allowing firms to distribute work in new ways and increase the use of temporary labour. With the introduction of innovative online platforms, new intermediary firms are connecting individual providers with individual customers, turning some full-time, long-term jobs into an uneven flow of “on-demand” tasks.

Current skills statistics, however, do not seem sufficient to address the scope and pace of such changes. The majority are based on educational attainments acquired in formal education, vocational training with standardised content or occupational classifications with codified and predictable tasks. As boundaries between disciplines fade away, the task content of occupations changes and the skills bundles required by new tasks are transformed. However, current skills statistics carry little information for the design of skills development systems.

In addition, digital technologies are creating new opportunities for skills development. Massive Online Open Courses (MOOCs), Open Educational Resources (OER), and blended (on- and off-line) instruction are modifying learning methods and giving more people access to flexible, good quality resources. However, too few of these changes are captured by available statistics. More detailed and timely statistics are needed to forecast long trends, identify emerging skill demands, and respond with an adequate supply of education and training.

Options for international action

There are at least four areas where stronger international co-ordination could lead to better skills statistics: job tasks surveys, skills assessments, expert and science-based technology evaluations and online job vacancies. Each of these four approaches has its own limitations, but their combination seems able to provide useful and timely insights into the changes in skills demand driven by digitalisation (Spiezia, 2018).

Job tasks surveys are very useful to identify how job characteristics change over time and to infer the implications of these changes on the demand for skills. Very few countries, however, have established surveys of this type. The US Occupational Information Network (O*NET) is one of the best-known (<https://www.onetonline.org/>), and in the United Kingdom, the Employer Skills Survey provides a comprehensive picture of skills needs and training investment, including vacancies and skills shortages, employee skill gaps and the recruitment of education leavers and young people (<https://www.gov.uk/government/publications/ukces-employer-skills-survey-2015-uk-report>). In Germany, the BIBB/BAuA Labour Force Surveys (<https://www.bibb.de/en/2815.php>) provide information on the workplace as well as on the relationship between education and employment. One main reason why job tasks surveys are not common is the high cost of developing and conducting such surveys. Importantly, the measurement of workers' skills is based on self-reporting and no formal assessment is carried out on their actual skill levels. Skills assessment surveys, therefore, function as a key complementary tool to improve understanding of skills needs.

The OECD Programme for the International Assessment of Adult Competencies (PIAAC) and the OECD Programme for International Student Assessment (PISA) are well known, cross-country skills assessment programmes. As with the job tasks surveys, PIAAC asks questions about a range of job characteristics and work skills. In addition, PIAAC tests participants through formal tests in order to assess their literacy and numeracy skills and their ability to solve problems in technology-rich environments (i.e. to use these tools to access, process, evaluate and analyse information effectively).

While PIAAC targets adults, PISA tests the skills and knowledge of 15-year-old students in science, mathematics, reading, collaborative problem solving and financial literacy. Like PIAAC, PISA not relies on the respondent's self-assessment but also carries out formal tests of these skills.

A third, useful approach to identifying emerging skills needs is to ask experts for their assessment of what tasks, currently performed by humans, can or could be performed by digital technologies within a short time horizon. A widely cited study by Frey and Osborne (2013), which estimates that 47% of US employment is at a high risk of automation over the next several decades, is based on this approach. In 2016, the OECD asked a group of 11 computer scientists to review the test questions in PIAAC and to identify the questions that could be answered by machines today. Overall, the experts' assessment suggests that the level of computer performance in three skill areas – literacy, numeracy and problem solving – is comparable to that of many workers. Only 13% of the workforce in OECD countries uses the three PIAAC skills on a daily basis and demonstrates a proficiency clearly exceeding the capabilities that computers are capable of reproducing (Elliot, 2017a). Based on a review of computer science research literature, Elliot (2017b) argues that IT capabilities could provide the reasoning, vision and movement skills required in most current jobs. Only in the area of language skills, does the analysis suggest that a substantial number of current jobs have skill requirements that clearly outstrip the IT capabilities demonstrated in the research literature. For this approach to become useful for skills development policies, expert and science-based assessment should be carried out systematically, considering more specific tasks and occupations, and across different countries. This is clearly one avenue where official statistics should consider greater investment.

Finally, online job vacancies have major potential as a source of information on the characteristics of job offers, job seekers and the duration of job postings. They are able to track labour market movements in real time, providing high-frequency data. Furthermore, they permit analysis of shifts in job profiles based on a large range of job requirements on skills, education and experience. Nevertheless, online job vacancies also have some shortcomings, including restricted coverage, biased samples and low international comparability, which future developments in data collection and treatment may be able to overcome.

References

- Autor, D.H. (2015), "Why are there still so many jobs? The history and future of workplace automation, *Journal of Economic Perspectives*, Vol. 29/3, pp. 3-30, <http://dx.doi.org/10.1257/jep.29.3.3>.
- Elliott, S. (2017a), *Computers and the Future of Skill Demand, Educational Research and Innovation*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264284395-en>.
- Elliott, S. (2017b), "Projecting the impact of information technology on work and skills in the 2030s", in J. Buchanan et al. (eds.), *The Oxford Handbook of Skills and Training*, Oxford University Press, Oxford, <http://dx.doi.org/10.1093/oxfordhb/9780199655366.001.0001>.
- Frey, C.B. and M.A. Osborne (2013), *The Future of Employment: How Susceptible are Jobs to Computerization?*, Oxford Martin School, Oxford.
- Nedelkoska, L. and G. Quintini (2018), "Automation, skills use and training", *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing, Paris, <https://doi.org/10.1787/2e2f4eea-en>.
- OECD (forthcoming), "Determinants and impact of automation: An analysis of robots' adoption in OECD countries", *OECD Digital Economy Papers*, OECD Publishing, Paris.
- OECD (2016a), "New forms of work in the digital economy", *OECD Digital Economy Papers*, No. 260, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jlwnklt820x-en>.
- OECD (2016b), "New skills for the digital economy", *OECD Digital Economy Papers*, No. 258, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jlwnkm2fc9x-en>.
- Spiezia, V. (2018), "Getting skills right: Measuring the demand for skills in the digital economy" in Eurostat (ed.), *Power from Statistics: Data, Information and Knowledge – Outlook Report 2018*, European Commission, Brussels, <http://dx.doi.org/10.2785/721672>.