

● WHAT COMES AFTER?

BEYOND4.0 supports an inclusive European future via examining the impact of Industrie4.0 and the Digital disruption on the future of jobs, business models and welfare.



POLICY BRIEF #4

Skills for the Digital Transformation

April 2021

BEYOND4.0 BEYOND4.0 supports the delivery of an inclusive future of decent work and decent lives for EU citizens. This Policy Briefing focuses on the impacts of digitalisation on skill needs and requirements for vocational education and training (VET) systems. Drawing on existing literature BEYOND 4.0 is currently carrying out on the future of skills, this policy briefing outlines the opportunities and challenges of the digitalisation for EU skills policy, national VET systems and regional skill ecosystems. Current EU policy thinking is summarised, and recommendations are also offered to support future evidence-based policy development:

- Better recognition of the need for a combination of digital and professional skills in VET systems
- Foster better use of advanced digital technologies and aligned with pedagogical innovations in VET
- Ensure that inclusive education is embedded in a network of service providers, with a remit to address not only skills but also the needs of socially disadvantaged and vulnerable groups in the labour market
- Improve the responsiveness of VET systems to the skill needs of labour markets
- Ensure the embeddedness of education/VET 4.0 measures in systemic approaches
- Improve the evidence base of policies on Education/VET 4.0

Background to Policy Brief #4

Funded by the Horizon 2020 programme, BEYOND4.0 examines the impact of new digital technologies on the future of jobs, business models and welfare in the European Union (EU). It

aims to support the delivery of an inclusive European future that provides decent work and decent lives for EU citizens.

Two particular digital disruptions are salient to policymakers. The first is the digitalisation of production, epitomised by Industry 4.0. The second involves the digitalisation of work mediated by platforms, sometimes known as ‘Uberisation’. This Policy Brief focuses on the first development, Industry 4.0, and its impact on future work and skills. It is an extract of a BEYOND 4.0 deliverable which will be published in September 2021 examining the demand and supply side for new skills and the role of inclusive approaches to mitigate expectable skill gaps. Based on this examination, the opportunities and challenges are highlighted in this Policy Brief, followed by an outline of current policy thinking about skills supply and recommendations for further evidence-based modernisation of VET systems..

Digitalisation and its impact on skill demand and supply

Digitalisation is expected to permeate the entire world of work and have far-reaching effects on jobs and work tasks. Some tasks, especially physical and manual, are expected to be less important in the future of work due to their risk of being automated and lost. There is a broad range of estimations about how many jobs could be automated, but these estimations are not consistent, varying by the research methodology employed. However, it can be assumed that a significant transformation of the world of work will occur and, with changing task composition, that some skills will be more and others less in demand.

As part of this transformation, there will be a new division of tasks between digital technologies and human workers. Automatable tasks will be undertaken by new technologies, and tasks that require social or creative skills remain with humans. These human-centred skills will therefore increase in importance. As a consequence, manual and physical tasks will be increasingly automated while interactive and higher cognitive tasks will continue to be done by workers.

However, the extent to which this transformation occurs also depends on company strategies. Some companies will choose to adopt a strategy of automation, whereby technology takes over as many tasks as possible, and people only perform residual activities. Other companies will choose the augmentation approach, whereby technologies are used to complement and enhance the skills of human workers.

The question then arises about which skills will be needed more and which less in the future.

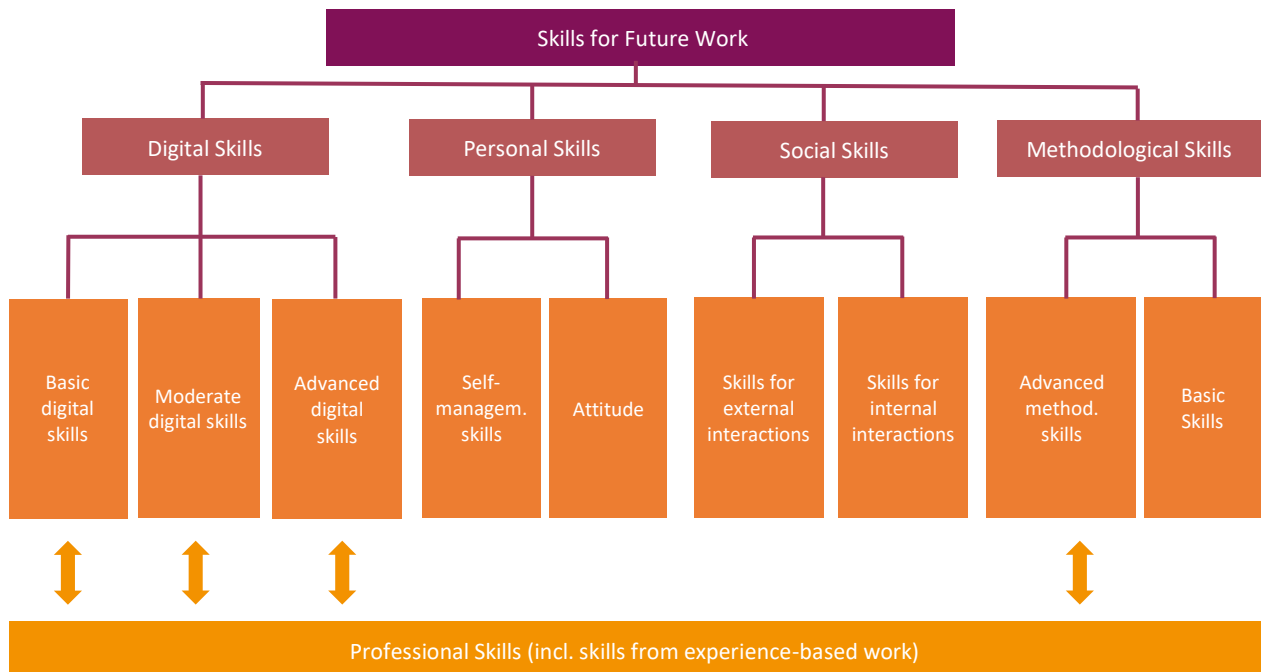
Given the division of tasks, it is likely, that a broad range of skills will be needed in the digital transformation. Digital skills will be needed but also transversal skills such as personal, social and methodological skills. Often, hybrid skills will involve a combination of digital/technological skills and non-technological/transversal skills. It should be noted, however, that another important type of skills is professional skills, sometimes called occupation-specific skills. These skills tend to be neglected in the literature but can have a significant role in digitalisation. Indeed, the combining of digital and professional skills should feature more prominently in the literature. At the core of



Industrie 4.0 are the integration of the physical world (e.g. equipment, transport vehicles, containers) and the virtual world of digital tools. Together, they form cyber-physical systems.

This differentiation suggests the need for a framework of skills categories covering digital skills, personal skills, social skills, methodological skills and professional skills.

Diagram 1. A framework of skills for future work



New skill demands require not only new training and education content but also new programmes, and which can also be innovative. Current examples of such pedagogical innovations include learner-centred education, project-based learning, problem-based learning, experiential learning, challenge-based learning, game-based learning and collaborative learning. Moreover, the digitalisation of education and training is on the rise. Using digital technologies for VET delivery offers wider access to learning resources, enables new learning arrangements such as blended learning (e.g. flipped classroom) and can support problem-solving in the real world by using simulation, augmented reality (AR) and virtual reality (VR).

‘Education 4.0’ and ‘VET 4.0’ are terms that reflect the response of education and training to Industrie 4.0. Many strategies, initiatives and programmes focus on a high, conceptual level. However, it is an open question as to whether and to what extent these concepts translate effectively into the classroom or workplace.

Opportunities and challenges

The digitalisation of production provides both opportunities and challenges for employment, work content and inclusiveness. Sometimes the task is to identify which – an opportunity or challenge – exists. For example, it is currently still difficult to estimate the impact of digitalisation on levels of employment. Some authors focus on the jobs at risk through automated and consequent unemployment. Others highlight the potential of digitalisation to create or grow new occupations (e.g. big data analysts, drone operators) and jobs. Effects, therefore, might be negative or positive.

A basic assumption is that jobs that comprise a high share of repetitive physical, manual or routine cognitive tasks will be at risk of automation. Jobs involving inherently social and creative tasks will be safe from automation. It might be, therefore, that one opportunity is the replacement of jobs with dissatisfying, repetitive tasks with jobs comprising ~~more satisfying, complex tasks.~~

In terms of the levels of skills that might be more and less in demand, different scenarios are offered in the literature. Skill polarisation and upgrading are frequently suggested. Polarisation means that



demand for high- and low-skilled workers will increase, although low-skilled less so. In contrast, demand for intermediate level-skilled workers will decrease because their tasks are more at risk of automation. Upgrading, however, means a general transition to higher-skill jobs, with the number of low-skilled jobs decreasing. Alternatively, it might be that skill demands increase at every level due to changes of work in the digital transformation.

Digitalisation also provides opportunities and challenges in terms of inclusiveness. On the one hand, digital tools offer better access to (online) education and training resources that are independent of time and place of learning. Digital tools such as 'pick by voice' enable migrants and low-skilled workers to get and keep jobs because these systems provide advice in different languages, e.g. how to commission a package. That makes it easier to perform the task even if the worker has only limited language skills. On the other hand, limited access to computer hardware/fast internet connectivity and limited digital skills hinder access to such education and training. This is called digital exclusion or the digital divide. It is often associated with the social background of learners; digital exclusion thus often also means social exclusion.

The gap in current policy thinking

Current policy thinking to deal with the challenges and opportunities surrounding VET 4.0 and Education 4.0 tend to be focused on two levels of abstraction: the system level and the classroom or workplace level. Responses have been developed at these two levels across Europe and by countries and regions.

Responses at the system level deal with overarching targets, strategies, initiatives and programmes in place to mitigate skill gaps, encourage innovation in education and training, and address inclusive education. Responses at the classroom and workplace level target individual teachers/trainers, learners and (vocational) schools to implement measures to provide the skills needed for the digital transformation. By way of illustration:

1. Initiatives at the system level that focus on inclusiveness are (i) the 2030 Agenda for Sustainable Development aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all globally (Sustainable Development Goal 4; <https://sdg4education2030.org/the-goal>), and (ii) the European Pillar of Social Rights which stresses inclusive education..
2. Initiatives at the system level that focus on digital transformation such as (i) 'Education 4.0' and 'VET 4.0' to respond to the requirements of Industry 4.0, including digital innovations to pedagogy to modernise vocational education and training; (ii) key initiatives such as the Working Group Education and Training 2020, the Digital Education Action Plan, the Digital Skills and Jobs Coalition and the New Skills Agenda for Europe; and (iii) under the heading of 'VET 4.0' there are a number of projects to address the skill requirements of digital transformation.



At the classroom level: individual teachers/trainers and learners are implementing concepts such as blended learning, learner-centred education, problem-based learning and project-based learning. In the classroom and at the workplace, digital tools are in place to support new learning arrangements and to provide digital (and transversal) skills.

Currently, there is a gap between programmes and initiatives on system level and concrete decisions/actions on the classroom/workplace level which has to be mitigated to make consistent use of the potential of digitisation. Our analysis of the current literature suggests these classroom or workplace level activities lack systematisation and coordination, such as working frameworks for individual activities, IT support and exchange between teachers/trainers. Teachers and trainers need coordination and support from the system level to choose digital tools, to develop digital skills or to improve exchange with other teachers/trainers. There is a need to bridge the two levels by strengthening the intermediary level, which could be established at the regional (skill) ecosystems.

Policy Implications and Recommendations

Analysis of current policy thinking reveals a need for changes in VET in order to tackle the challenges of digital transformation. Generally, VET systems lack responsiveness to the needs of the labour market. The consequence is that the skills content of jobs is not sufficiently reflected in VET systems. A number of actions by actors in VET system and educational policymakers could address this problem:

1. *Better recognition of the need for a combination of digital and professional skills in VET systems*



While providing digital skills and transversal skills is explicitly addressed by current policies (and professional skills seemingly embedded in VET), the need for combined skills is usually neglected by VET related policies. Industry 4.0 requires the integration of professional skills and digital skills as it is characterised by cyber-physical systems bringing together the physical world and the virtual world of production processes.

2. *Foster better use of advanced digital technologies and align them with innovations in VET pedagogy*

Policymakers should make a distinction between different levels of digital technologies. While currently, first order innovations (such as movies, text files) are already forms of digitalisation that feature in VET, more advanced technologies, such as AR/VR and AI, are rarely found. They should feature more strongly. Furthermore, policy should push for the digitalisation of learning and the integration of digital tools in classroom/workplace learning to making better use of pedagogical innovations (e.g. learner-centred education).

3. *Ensure that inclusive education is embedded in a network of service providers, with a remit to address not only skills but also the needs of socially disadvantaged and vulnerable groups in the labour market*

Inclusiveness is as important in EU and national education policy. There is also awareness of the opportunities of digitalisation for inclusiveness as digital tools enable wider access to education resources, for example. At the same time, vulnerable groups are recognised as being at risk of digital exclusion due to a lack of digital skills and access to these digital tools. VET has a vital role to play in providing these skills to counteract this risk in both working and social life. Ensuring digitalisation inclusion requires more than simply enskilling through training, it also needs to take into account the social background of those workers needing this training

Research conducted within the ESSA-project, part of the New Skills Agenda for Europe, shows how these three recommendations are already being experimented through different types of VET systems in Europe. Solutions are developed by a combination of European actors such as CEDEFOP, the European Training Foundation and DG Education and Culture plus Member States and regional actors. This combination is needed because of the diffused responsibilities for education and training within different Member States. In all cases, however, the formal cooperation of employers' associations and trade unions is important. Labour market services also need to work with Ministries of Labour and Social Affairs (and their equivalents across the EU) and public employment services

In addition, structural changes to VET systems need to be pursued by policymakers:

4. *Improve the responsiveness of VET systems to the skill needs of labour markets*

Currently, VET systems are not sufficiently prepared to respond to changing labour markets. The best strategy is to enhance the capacity of VET systems to respond to the technological transformation and its consequent skill demands

5. Ensure the embeddedness of Education/VET 4.0 measures in systemic approaches

This can be one by embedding Education/VET 4.0 measures in systemic approaches. VET systems are too fragmented with pedagogy innovations only sporadically implemented and not well aligned. While there are general concepts of Education/VET 4.0 at the system level, many measures are based on activities of individual teachers/trainers, learners and schools which lack coordination and support. One option for this bridging effort would be to look at the intermediary level of regional skill ecosystems. These regional skill ecosystems should be strengthened. This approach helps to better align the two levels and it helps embedding skill improvements in regional innovation strategies.

6. Improve the evidence base of policies on Education/VET 4.0

The European agency Cedefop provides overviews of national policies, strategies, initiatives and projects of EU Member States around Education/VET 4.0. However the success or effectiveness of these activities remains unclear. Most initiatives are mainly pilot projects from which the question is whether they can be scaled up to affect national performance in VET 4.0. Their longer term effectiveness needs to be better understood.

Recommendations (4-6) are more VET and Education System oriented and need to be mainly addressed by national or regional authorities. Coordination between such examples is vital. To coordinate across the Member States, the national contact points of CEDEFOP are vital, e.g. ECCTIS in the UK) and Fundae in Spain.

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Project Identity

Project name	Inclusive Futures for Europe BEYOND the impacts of Industrie 4.0 and Digital Disruption — BEYOND4.0
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