

Maximising the impact of EU initiatives on skills

Is the EU's skills policy prepared
for future labour market shifts?



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Abstract

This study provides details of the current situation and future trends in the EU concerning aspects related to skills demands, skills shortages, and skills mismatches. It takes into consideration the transformative role of the digital and green transitions and the labour market shifts determined by demographic changes. The analysis comprises a presentation of the various EU skills initiatives, assessing their impact, complementarity and gaps. And formulates a set of recommendations to address gaps identified in the EU skills policy.

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LIST OF ABBREVIATIONS

AES	Adult Education Survey
AI	Artificial Intelligence
AMPWork	Algorithmic Management and Platform Work Survey
CEDEFOP	The European Centre for the Development of Vocational Training
CoVEs	Centres of Vocational Excellence
CVTS	Continuing Vocational Training Survey
DigComp	European Digital Competence Framework
DIGITAL	Digital Europe Programme
EaFA	European Alliance for Apprenticeships
EC	European Commission
EDSC	European Digital Skills Certificate
EEA	European Environment Agency
EEC	European Economic Community
EFTA	European Free Trade Association
EGD	European Green Deal
EGF	European Globalisation Adjustment Fund for Displaced Workers
ELA	European Labour Authority
EntreComp	European Entrepreneurship Competence Framework
EQAVET	European Quality Assurance in Vocational Education and Training
EPSR	European Pillar of Social Rights
ERDF	European Regional Development Fund
ESF+	European Social Fund Plus
ESJS	European Skills and Jobs Survey

ETF	European Training Foundation
EU	European Union
EURES	European Employment Services
EUROFOUND	European Foundation for the Improvement of Living and Working Conditions
FGB	Fondazione Giacomo Brodolini Srl SB
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GPTs	Generative pretrained transformers
GreenComp	European sustainability competence framework
HaDEA	European Health and Digital Executive Agency
HE	Higher Education
HRM	Human Resource Management
ICT	Information and Communication Technologies
ILAs	Individual Learning Accounts
LIFE	Programme for Environment and Climate Action
LFS	Labour Force Survey
MS	Member States
NEET	Young people not in education, employment or training
NIPs	National Implementation Plans
NRPs	National Reference Points
OECD	Organisation for Economic Co-operation and Development
OJAs	Online Job Vacancies
ResearchComp	European Competence Framework for Researchers
RRF	Recovery and Resilience Facility

SMEs	Small and Medium Size Enterprises
STEM	Science, Technology Engineering, and Mathematics
SURE	European instrument for temporary Support to mitigate Unemployment Risks in an Emergency
TFUE	Treaty of the Functioning of the European Union
TSI	Technical Support Instrument
USA	United States of America
VET	Vocational Education and Training
YEI	Youth Employment Initiative
YG	Youth Guarantee

EXECUTIVE SUMMARY

Background

Since the turn of the decade, the EU economy has demonstrated remarkable resilience. The previous decade saw the economy recover from the 2008 financial crash before COVID-19 containment measures plunged the economy into recession. As the economy quickly rebounded once the COVID-19 containment measures were lifted, reports of labour and skills shortages became commonplace. In part, this reflected the speed with which the economy recovered. Expectations are that the higher wages employers offer to secure the labour they require will, other things being equal, dampen their profits and thereby reduce their demand for labour.

There are, however, other factors which suggest that meeting the future demand for skills will not be without difficulty. The digital, green and demographic transitions, which all EU Member States (MS) are currently subject, pose numerous challenges for both skills supply and skills demand. The digital and green transitions are expected to make some skills obsolescent while creating demands for new ones. At the same time, the EU's shrinking and ageing labour force simultaneously creates its own demand for skills (e.g., for elderly care) and reduces the volume of labour supply. For the time being, there remains uncertainty about the eventual impact of these three transitions on the overall demand for labour, the specific kinds of skills which will be in demand, and the extent to which skill demand can be satisfied.

The EU has developed a range of policies designed to equip MS with the means to adapt to whatever changes in skill demand arise over the medium-term. These range from strategies and agendas which provide an overall framework for developing specific measures to address future skill needs, to the design of those measures.

Aim

The aim of the study is to provide a comprehensive understanding of how skills demand is likely to change over the medium-term as MS adapt to the digital, green, and demographic transitions. It also addresses the EU's policy making in the area of skills to assist MS to respond to future change so that skill mismatches do not act as a constraint on competitiveness. The study is based on a review of research studies which address the EU's skill needs along with a review of key policy developments over the recent past. The study is in three parts: (i) an assessment of emerging skill needs in the EU; (ii) a review of EU skill initiatives; and (iii) identification of policy gaps and how these might be addressed.

Key Findings

The future demand for skills

Evidence increasingly and consistently demonstrates that the digital transition, and to a lesser extent, the green one, will change the task content of existing jobs. Workers will need to acquire new skills to augment and /or replace existing ones. Although the evidence reveals the relatively benign effects of the twin transitions on employment and skills demand to date, the scale of future changes is far from clear. The history of technological change – or that of greening – suggests that it increases incrementally. This may be good news for education and training systems insofar as the need to manage rapid and radical change is reduced. Nevertheless, there is still a risk that more significant changes in the demand for skills will take place in the future, especially if the digital transition gathers pace.

Skills matching remains a challenge in the EU. Although measurement problems bedevil the analysis of skills mismatches (especially skill shortages), there is a consistent body of evidence which suggests that the key skills matching problem facing the EU is the over- rather than under-supply of skills. This, it should be noted, is derived from the evidence which reveals the substantial tranche of workers who possess qualifications higher than those typically required in their current jobs. That said, there is also evidence of skill shortages as well, but these are on a smaller scale.

In summary, the impact of twin digital and green transitions on employment and skill demand, for the time being, appears to be relatively muted. Workers' skills tend to be augmented rather than substituted by the twin transitions. Should the transitions accelerate, then this is likely to place even greater pressure on skills systems across the MS to match skills supply to demand.

EU policy making

The EU has adopted a comprehensive approach to tackling the EU's skill needs. This is reflected in the development of:

1. the underlying principles and strategic approaches to guide skills development across the EU (e.g., Charter of Fundamental Rights of the European Union, European Pillar of Social Rights, and European Skills Agenda);
2. measures to increase the volume of skills supply (e.g., recommendations, respectively, on Individual Learning Accounts and Reinforcing the Youth Guarantee);
3. processes to improve the quality of skills supply (e.g., Centres of Vocational Excellence, European Quality Assurance in Vocational Education and Training);
4. provision of information on skills needs (especially the development of skills anticipation systems);
5. co-operation and social partnership activities to promote skills development (e.g., the Pact for Skills, Blueprint Alliances);
6. funding opportunities to support a variety of skill initiatives at the MS level (e.g., via Erasmus+ and the European Social Fund).

The comprehensive range of activities developed at the EU level provide a wide range of supports to assist MS adapt to the challenges posed by the twin transitions, and increasingly, the demographic one. They provide a framework which can be applied across national skill systems which reveal considerable variety with respect to skills challenges faced and the means to address them. The study, nevertheless, highlights potential policy gaps. Nearly all EU skill initiatives are focused on skills supply. There is scope to consider further how skills demand might be increased. Given the EU's goal of improving its competitiveness in the global economy, there is a need to think about how employers can be encouraged to invest more in the skills of their workforce as part of an integrated range of measures to improve organisational performance. There is also a policy gap in relation to the green transition. It is clearly important, but the skill needs which are likely to arise from it, are not always clear from a policy perspective. With respect to skill mismatches, there is a need to develop a more definitive measure of skill shortages so that there is a clearer idea of where investments in skills need to be targeted. Finally, access to skills development for those with non-standard forms of employment need to be addressed. It may be that in the future more people are self-employed, especially if platform working becomes more commonplace. How this group's skill needs will be met requires more consideration by policy makers.

Recommendations

A focus on the demand side. Policy making tends to concentrate almost wholly on the supply-side. There is a need to think more about the measures needed to assist employers raise their demand for skills to improve their organisational performance. A focus on the demand side is about identifying how the demand for skills can be stimulated to shift the EU economy towards a higher skills equilibrium.

Tackling skill mismatches. Over the longer-term, improvements on the supply-side, which make it more responsive to satisfying current and future skills supply, may well reduce the degree of skills mismatch. But this does little to assist those who are currently mismatched in their current jobs. There would appear to be space for measures over the short-term to assist those who are either over- or under-skilled to find a better employment match.

Improving labour market skills intelligence about skill mismatches. Information about skill mismatches of individual workers is relatively well developed in the EU, but information about skills shortages is under-developed. Do employers face difficulties recruiting people with the skills they need because those skills are in short-supply, or because the terms and conditions of employment on offer are below the going rate? The evidence is not clear.

Being clear about green skills and green jobs. The green transition and the demand for green skills are sometimes something of a black box. It is often taken for granted that there is an understanding of what is involved. There is a need to be clearer about what the green transition will mean in practice and the types of skills that are likely to arise.

Improving access to high-skilled jobs and training, especially for those in non-standard forms of employment. There is recognition that access to some jobs, especially highly skilled STEM related ones, is unequal. There is the danger that future change will exacerbate this situation. It may be timely to consider how existing policy responses to tackle unequal access to skills development might be future-proofed.

Skills framework simplification. In undertaking this review, large swathes of policy making have been commented upon. This reflects the complex nature of the issues being addressed. There is scope to think about how to streamline EU level skills policy making or present it in a way that it makes easier to understand it in its entirety.

1. INTRODUCTION

The digital, green and demographic transitions, which all European Union (EU) Member States (MS) are currently experiencing, pose numerous challenges for skills supply and demand. The digital and green transitions result in some skills becoming obsolescent while creating a demand for new skills. At the same time, the EU's shrinking labour force simultaneously creates its own demand for skills and reduces the volume of labour supply. This places an increased importance on skills matching. With fewer people available to fill jobs, it is all the more important that skills supply matches demand. Although there have been substantial improvements in skills anticipation over time, the emergence of new kinds of economic activity often associated with the diffusion of new digital technologies and the need to tackle climate change, has made the task of identifying emerging skill needs progressively more difficult. Information about future skill demand needs to be accurate, detailed, and timely to avoid the risk of damaging skill mismatches arising. The collection and dissemination of labour market skills intelligence is only part of the story. There is a need for a range of actors to use the information provided to ensure that the supply of skills has value in the labour market.

This study serves as a stock taking exercise. It summarises various EU initiatives to improve the supply of skills. It is structured in three parts. It starts by providing a description of current and anticipated skill demands in the EU. This is followed by a concise presentation of the impact and complementarity of EU skill initiatives, together with an assessment of where there may be policy gaps. Finally, conclusions and policy recommendations are provided. It will be shown that initiatives are focused almost wholly on skill supply. Stimulating the demand for skills, it would appear, is often the remit of industrial strategies rather than skills policy per se. That said, the EU has developed an innovative range of measures to improve the supply of skills designed to promote competitiveness in a socially inclusive manner. These include:

- advocating the importance of vocational education and training (VET) to improve skills matching;
- providing an infrastructure to improve the supply of skills, including the role played by the European Centre for the Development of Vocational Training (Cedefop), and the support provided to Member States by, for example, European Quality Assurance in Vocational Education and Training (EQAVET);
- setting targets and objectives to improve participation levels in training and raise levels of educational attainment;
- adopting measures to stimulate skills provision (e.g., the recommendations on Individual Learning Accounts, amongst many others); and
- sharing information and knowledge among Member States.

Because the EU has been actively engaged in developing policies and mechanisms to promote skills development since the signing of the Treaty of Rome (1957), it has substantial experience to draw upon to develop future responses to whatever skill challenges might arise.

2. THE FUTURE DEMAND FOR SKILLS ACROSS THE EU

KEY FINDINGS

The impact of the twin digital and green transitions on skills demand remains uncertain, not least of which is the uncertainty attached to the impact artificial intelligence (AI) may yet have on employment levels and skills. At the moment, any impacts appear muted.

Despite concerns that new technologies might destroy jobs and have a detrimental impact on job quality, this is not supported by the evidence. It is, however, increasingly evident that automation, digitalisation and the rise of AI will necessitate individuals to continually acquire new skills within their current jobs.

The recent past demonstrates that both the demand for, and the supply of skills, has increased. This has been accompanied by a substantial amount of skills mismatch, especially over-qualification.

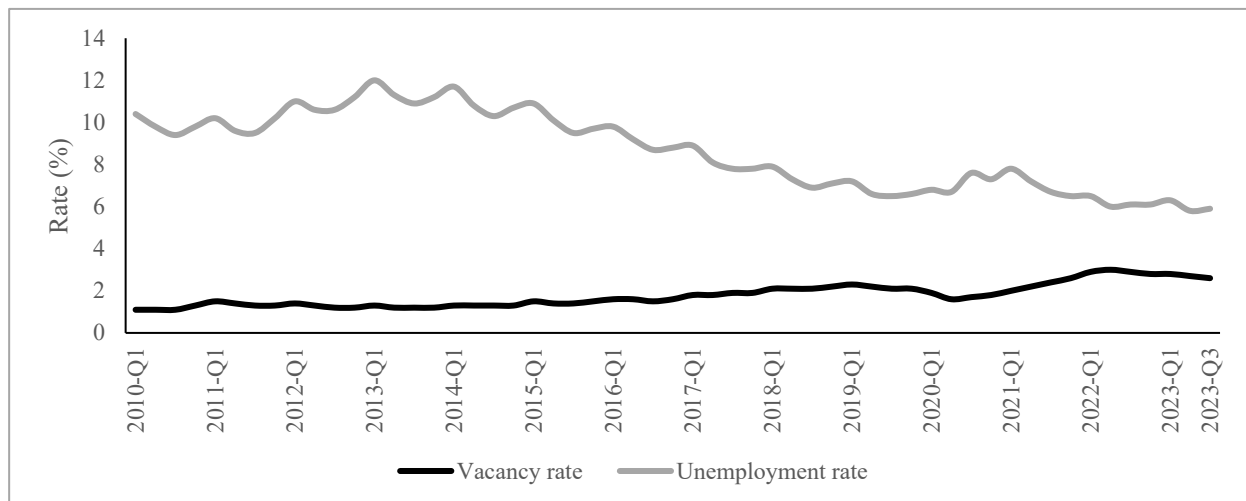
The EU's talent pool is not put to its full use. There is, for instance, a high degree of occupational segregation by sex. And the extent of over-qualification /over-skilling indicates that individuals' talents are not being fully exploited.

The above point is important because, during a period when demographic change will see the labour force shrink even further, there is a need for the EU to make use of all the talents available to it.

2.1. The Economy and Labour Market

Since the turn of the decade, the EU economy has experienced a roller-coaster ride. The previous decade saw the economy recover from the 2008 financial crash before COVID-19 containment measures plunged the economy into recession. During 2020, GDP (gross domestic product) declined by 6.5 per cent in the EU27. GDP growth rebounded strongly during 2021/2022 as containment measures were relaxed. This resulted in a rapid economic bounce back, and with it, inflationary pressures quickly emerged, which were further heightened by the war in Ukraine. These developments have implications for both labour and skills demand. Despite the precipitous drop in economic output, there was no commensurate increase in unemployment largely because Member States introduced a wide range of employment support measures. Of particular importance was the European instrument for temporary Support to mitigate Unemployment Risks in an Emergency (SURE), a crisis management instrument with a budget of EUR 100 billion designed to help MS protect jobs and incomes. It is estimated that SURE funding made a substantial contribution to preventing around 1.5 million people becoming unemployed in 2020 (European Commission, 2023). The immediate post-pandemic period was characterised by historically low unemployment rates and high vacancy rates – see Figure 1 – widespread labour shortages affecting much of the EU (ELA, 2024). Inevitably this has seen reports of skill shortages emerge even if the EU's main skills mismatch problem remains that of over-qualification (Cedefop, 2022a).

Figure 1: Employment and vacancy rates, 2010 to 2023



Source: Eurostat job vacancy statistics [jvs_q], available at: https://ec.europa.eu/eurostat/databrowser/view/jvs_q_nace2/default/table?lang=en; unemployment statistics [lfsq_urgan], available at: https://ec.europa.eu/eurostat/databrowser/view/lfsq_urgan/default/table?lang=en.

The fall in real wages, which has characterised the post-pandemic containment period, fuelled the demand for labour and the resulting labour and skill shortages (ELA, 2024). The return of real wage growth, driven by labour shortages, should eventually eat into firms' profits and reduce the demand for labour and ease shortages (European Commission, 2023a). Demographic change, however, across the EU continues to reduce labour and skills supply such that scarcity rather than abundance may well be the hallmark of the next ten or twenty years. Unless there is a precipitous fall in employment levels, labour shortages may prove to be persistent in some sectors and occupations. This inevitably places an even greater economic imperative than hitherto on matching skill supply to demand to support economic growth and competitiveness. It also means having a clear idea of the skill needs which are likely to arise over the medium term and how their supply can be best met. This is a formidable challenge given the uncertainties which face many economies, not least of which are current global political tensions and their impact on supply chains and the way in which artificial intelligence may (or may not) transform the world of work.

2.2. Future Skills Demand

The macro- and micro-level factors which determine the demand for skills have been well documented (see Cedefop, 2018). These include:

- the sectoral structure of employment;
- employers' product market strategies;
- the diffusion of new technologies, including those linked to the digital and green transitions;
- regulation encompassing, amongst other things, those related to industrial strategy, climate change and sustainability; and
- demographic change.

Over time, productivity growth and globalisation have affected the **sectoral structure of distribution of employment**. It has contributed to an increasing share of employment accounted for by services at the expense of the primary and manufacturing sectors. At the same time, **technological change** has

resulted in the growth of relatively high skill demand driven in part by firms adopting higher value-added **product market strategies** because producers outside the EU with lower labour and production costs have a competitive advantage in the mass production of relatively low-cost goods and services. **Regulation** also has a role to play. Employment regulation can push producers into relatively high-value, high skill segments of the product market through, for instance, wage setting. In addition, regulation related to climate change and sustainability has an impact on the demand for certain products and services – such as those which facilitate the green transition – and the way in which they are produced (e.g., with reference to energy consumption). This all has implications for skills demand. Being able to meet changing skill demands is dependent upon there being sufficient people to fill jobs and supply skills. The pattern of **demographic change** in many EU Member States is that of population decline largely as a result of falling fertility rates. There is an expectation that, other things being equal, this will continue such that over the period 2024 to 2044, there will be an 8.5 per cent decline in the working age population¹. This is on top of the 1.4 per cent decline in the working age population, which took place between 2003 and 2023². Other things being equal, a shrinking population increases the need to reduce the labour intensity of production, which is likely to have an impact on the demand for skills. At the same time, population ageing creates its own demand for a range of products and services to support the increasingly large share of people living into old-age.

Cedefop's skill forecasts provide an indication of how skills demand is likely to change over the medium-term (Cedefop, 2022). Cedefop's forecasts use occupation and qualification as proxy measures of skill demand. Changes in occupational demand are driven in large part by changes in the sectoral demand for labour, which, in the future, will be increasingly concentrated in the service sector (especially in the health sector and real estate /professional scientific and technical services), with a marked fall in the number of jobs in the agriculture, farming and fisheries sector.

Over the period from 2022 to 2035, Table 1 reveals that there is projected to be a substantial net increase in the number of managerial, professional and associate professional jobs (i.e., high skilled jobs), with a corresponding fall in the number of clerks, skilled agricultural, and skilled trades workers (i.e., the working intermediate level skilled jobs). The number of elementary jobs (i.e., relatively low skilled jobs) will remain more or less unchanged. Table 1 also shows the level of replacement demand for each occupation between 2022 to 2035. People will leave a job for many reasons, including retirement. They will, to some extent, need replacing (replacement demand). When this is added to the overall change in the number of people employed in an occupation, this provides the overall number of new job openings to be filled. Table 1 shows that even in those occupations where the overall number of people employed is expected to fall, because of the scale of replacement demand, there will be a substantial number of new openings. For example, the number of people employed as clerks is expected to fall by 1.2 million between 2022 and 2035, but because a substantial number of clerks will leave the occupation over the same period, there will be 7.2 million job openings for clerks that will need to be filled.

¹ This is based on Eurostat's baseline population projection [proj_23np], available at: https://ec.europa.eu/eurostat/databrowser/view/proj_23np/default/table?lang=en.

² This is based on Eurostat's demographic statistics [demo_pjan], available at: https://ec.europa.eu/eurostat/databrowser/view/demo_pjan/default/table?lang=en.

Table 1: Projected changes in occupational employment, 2022 to 2035

	Employment levels (000s)		Employment change 2022 to 2035			
	2022	2035	Change in employment levels (000s)	% change	Level of replacement demand (000s)	Number of job openings (000s)
Legislators, senior officials and managers	10,965	11,149	184	2	4,855	5,039
Professionals	45,125	54,344	9,219	20	20,703	29,923
Technicians and associate professionals	34,050	37,127	3,076	9	14,304	17,380
Clerks	20,873	19,703	-1,170	-6	8,371	7,201
Service workers and shop and market sales workers	34,440	35,171	731	2	15,476	16,207
Skilled agricultural and fishery workers	7,259	5,537	-1,723	-24	3,662	1,939
Craft and related trades workers	24,812	24,218	-594	-2	10,173	9,579
Plant and machine operators and assemblers	16,285	16,939	654	4	7,209	7,863
Elementary occupations	18,768	19,001	232	1	9,323	9,555
Total	212,579	223,188	10,609	5	94,076	104,685

Source: Cedefop Skills Forecasts (excludes employment in Armed Forces occupations), available at: <https://www.cedefop.europa.eu/en/tools/skills-forecast>.

The evidence presented above shows that an increasing share of people will be employed in relatively high skill jobs in the future. This is reflected in the qualification levels of the EU's workforce. In 2022, 36 per cent of the EU's workforce were highly qualified (i.e., they possessed qualifications typically associated with tertiary level education). By 2035, this is projected to increase to 46 per cent. In contrast, the share of the workforce with low level qualifications (i.e., qualifications at a level associated with, at best, completion of lower secondary education) will decline from 17 per cent in 2022 to 12 per cent in 2035. Nevertheless, a substantial share of employment in the future will remain in relatively low skilled employment where workers sometimes lack the basic functional skills to progress into higher skilled employment. For example, in 2023, 18 per cent of individuals possessed low overall digital skills³.

Using occupation or qualification as a measure of skill while providing a useful quantitative assessment of change over time provides little insight into how skill needs are changing within jobs. The tasks a person employed as, say, an electrical engineer will need to perform in 2024 are likely to be different to those required in either 2015 or 2035. At the same time, new types of jobs are emerging. Autor et al. (2021), for example, estimated that around 60 per cent of employment in the USA in 2018 was found in jobs that had titles which did not exist in 1940. Looking to the future, two significant factors (i.e., digital and green transformations) are likely to shape and determine the jobs in which people work and the skills they require. These are considered next.

2.3. Automation, Digitalisation and Artificial Intelligence

Despite concerns that new technologies might destroy jobs or have a detrimental impact on job quality, this is not supported by the evidence. Instead, new technologies are seen to be productivity, employment and skill enhancing. Evidence, mainly drawn from the USA, reveals the association between the introduction of new information technologies and the growth of relatively high waged, high-skilled employment (Autor, 2022; Handel, 2022). This is referred to as skill biased technological change, where the introduction of new production technologies tends to favour skilled over unskilled labour by increasing its relative productivity and, thereby, its demand. Except that over time the evidence points to a hollowing-out of the occupational structure. The introduction of new information technologies over time revealed an association with employment growth in both relatively high-skilled /high-waged and low skill /low-waged jobs at the expense of employment in the middle of the occupational hierarchy (Goos et al., 2009). The jobs being destroyed were often skilled manual ones, but not exclusively so. This was explained by increased computing power allied to machine learning, which allowed more complex task patterns to be detected. Algorithms could be developed which enabled these tasks to be automated. The tasks might be relatively complex, but because they followed a set of rules, they could be replicated by computer programs (Autor et al., 2003). In contrast, managerial and professional jobs, as well as many relatively low skilled ones, had task repertoires which were not predictable and thereby not as at risk of automation. It is worth noting that the evidence is mainly drawn from the USA, with less evidence of this phenomenon in the EU (Eurofound, 2017). And some doubt has been cast over the demise of intermediate level jobs because these are seen to comprise a mix of skills, not all of which are substitutable, for now, by machines (Autor, 2015).

Advances in artificial intelligence, such as the emergence of generative pre-trained transformers (GPTs), have the potential to substantially disrupt the relationship between new technologies and skill demand. Jobs previously considered largely outside the reach of automation are now, possibly, within its scope. Whether the diffusion of AI results in job loss, changes in the task content of existing jobs, the creation of new jobs, or a mix of all these, is only just becoming apparent. Early analyses which sought

³ Eurostat database indicator Individuals' level of digital skills (from 2021 onwards), code for identification [isoc_sk_dskl_i21]. Available at: https://ec.europa.eu/eurostat/databrowser/view/isoc_sk_dskl_i21/default/table?lang=en.

to explore the impact on employment of technologies which made use of machine learning and AI suggested that nearly half of all jobs might be at risk of substitution by automation (Frey and Osborne, 2017). In practice, there is a need to disentangle the following effects of AI /automation on jobs and skills:

- automation /substitution – where machines take over some or all of the task requirements that comprise a job;
- augmentation – where machines complement the tasks undertaken by workers such that their productivity increases; and
- task reinstatement – where new tasks within existing jobs, or entirely new jobs, emerge as a consequence of AI.

Employers will have a degree of strategic choice about how they decide to introduce AI in the workplace, which will affect the extent to which automation, augmentation, and task reinstatement takes place. From a policy perspective, so long as the reinstatement effect is bigger than the automation /substitution one, then employment is not at risk, though new skill demands might arise (Acemoglu and Restrepo, 2018). Initial evidence, which will be further elaborated on below, suggests that the impact of AI to date has been limited. AI has been used to automate relatively low productivity tasks such that its capacity to transform the world of work leading to the emergence of new kinds of job and new kinds of skills has been limited (Acemoglu and Restrepo, 2020).

The evidence for Europe suggests that new digital technologies tend to have an augmentation effect and a relatively weak automation one. Analysis of the first European Skills and Jobs Survey (2014) suggested that between 8 and 14 per cent of jobs could be at risk of automation. These were largely low skilled jobs whose incumbents had limited access to training (Pouliakas, 2018). While the estimates of job loss provided by Pouliakas (2018) are still substantial, they are well below those estimates that suggest up to half of all employment being at risk of automation. Analysis of the second European Skills and Job Survey (2020) provides strong evidence that the main impact of digital technologies has been one of task augmentation (Cedefop, 2022a). The survey revealed that 4 per cent of respondents to the survey said that some of their job tasks had been replaced by new digital technologies without taking on different or new tasks. In contrast, 22 per cent experienced both task generation and destruction, while 9 per cent started doing new or different tasks. The survey also revealed that just over half of all workers needed to develop their digital skills to improve how they undertook their main job. AI appears to both increase and change the demand for skills. Acemoglu et al. (2022), for instance, observed an increase in the posting of online job vacancies (OJAs) for AI skills in the post-2015 period and a reduction in OJAs for non-AI skills that firms with a relatively high exposure to AI had previously sought (i.e., firms reduce their non-AI hiring). The evidence points to some tasks being lost and others being acquired by the existing workforce but with relatively little impact on job loss. By way of example, a study of AI's impact on language translators demonstrated that the introduction of higher quality automated translation tools across selected countries of the Organisation for Economic Co-operation and Development (OECD) did not reduce the demand for translators, rather, the machine translation tools augmented their activities, which improved the quality of translation (Borgonovi et al., 2023a).

From a skill policy perspective, there is a need to identify or anticipate the skill needs which will be in demand because of AI's increased diffusion. It is useful to make a distinction between the skills required to: (a) develop new AI technologies; and (b) use the AI technologies in a range of jobs. In relation to the former, the OECD has identified that the AI workforce is concentrated in a few specialised occupations: mathematicians, actuaries and statisticians, software development and application, developers, ICT managers, database and network professionals, and electro-technology engineers (Green and Lamby,

2023; OECD, 2023). It is a highly educated workforce (i.e., 60 per cent have a tertiary level degree) and is comprised mainly of men (60 per cent). This is, perhaps, always likely to be a rarefied, highly educated workforce. In contrast, a much larger share of the population will need to work with AI. For the time being, the impact on tasks content would appear to be modest. The second European Skills and Jobs Survey (ESJS) revealed that AI is yet to have a substantial impact on skills demand because a relatively small share of the workforce has been exposed to it (Cedefop, 2022a). When AI is introduced, it requires its users to possess a mix of both technical IT skills and various generic ones (see Table 2). There may well be a hybrid dimension to the generic skills element. Where, for example, problem solving skills are mentioned, it may well be in relation to the use of specific IT tools and computer programs rather than problem solving skills in general.

Table 2: OECD identified skill needs in the age of AI

	Type of skill	Examples
Skills to adopt, use and interact with AI applications	Elementary AI knowledge	Principles of machine learning
	Digital Skills	Ability to use a computer or a smartphone
	Other cognitive skills	Analytical skills Problem-solving Critical thinking
	Transversal skills	Creativity Communication Teamwork Multitasking

Source: OECD, 2023. Table 5.1, p. 163.

Overall, the evidence on the impact of technological change /digitalisation on skill demand points towards it being modest. One interpretation of the evidence provided above is that the full force of the digital skill transition is yet to be felt. This may well be because technological change in the workplace tends to be incremental rather than a big bang where all encompassing, large-scale change takes place all at once. Historical analysis of technological change repeatedly reveals employers to be cautious about making investments in new technology such that change is piecemeal rather than revolutionary (Bessen, 2015). Policy makers, as a result, are at least granted some time to adapt skills provision to the demands which emerge from the introduction of new digital technologies.

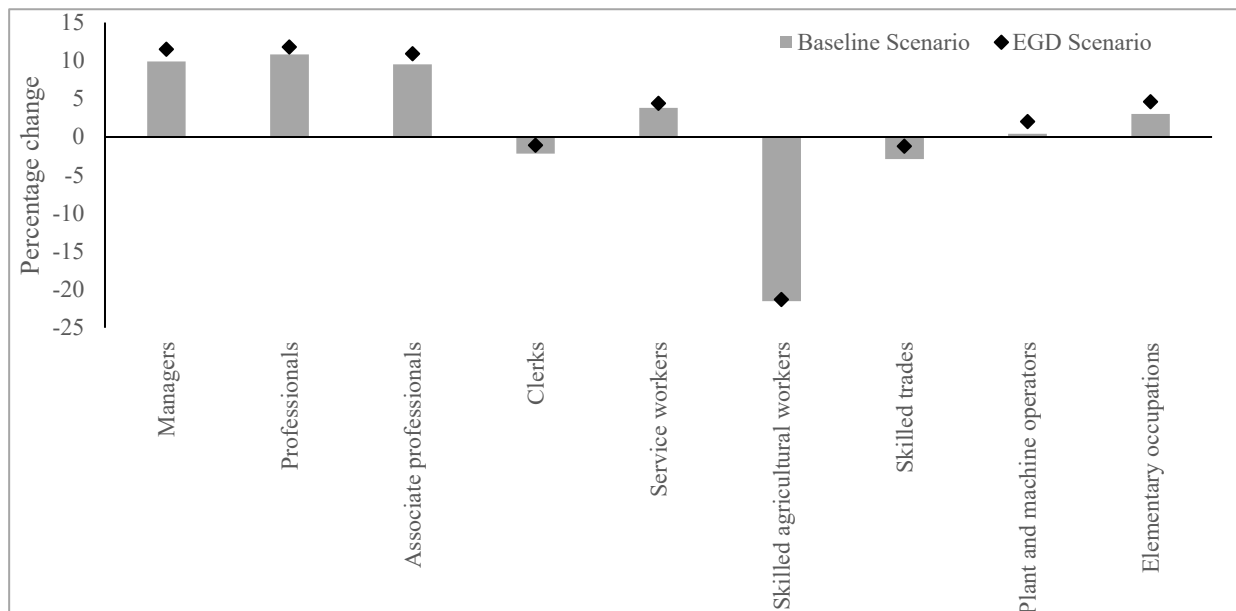
2.4. Skills and the Green Transition

The green transition is dependent upon a range of new technologies, including digital and AI ones, to assist employers adapt to climate change and increase sustainability. There is also a regulatory dimension encompassed by the European Green Deal (EGD). Much of the initial discussion about the green transition was about green jobs: i.e., the extent to which it was possible to identify specific jobs as green ones. This tended to focus on jobs where the primary purpose was protecting against environmental degradation. This mainly consisted of those in the environmental goods and services sector. This amounted to around 2.5 per cent of EU employment in 2021. Employment in the environmental goods and services sector has grown over the recent past. Between 2010 and 2021, there was an increase of 525,000 full-time equivalent (FTE) jobs related to the management of energy

resources, and an increase of 259,000 FTEs in waste management (EEA, 2024). Given the goals set out in the EGD and the Fit for 55 initiatives, continued growth in these jobs might be reasonably expected to continue over the medium-term.

Concentrating on the environmental goods and services sector is a relatively narrow lens through which to view the potential impact of the green transition on skills demand. To some extent, all jobs are likely to be subject to greening (Dierdorff et al., 2009). Cedefop's EGD scenario provides insight into the impact of the green transition on skills and jobs across the entire EU economy. The scenario captures various features of the EU's EGD with a view to understanding how it will affect skills demand measured by occupation. Overall, the EGD scenario shows a modest gain in employment of around 1.5 per cent over the 2020 to 2030 period compared with the baseline scenario (Cedefop, 2021). Under the EGD scenario, employment growth is much stronger in the water supply and waste management sector and weaker in mining and quarrying, gas steam and air conditioning, and coke and petroleum sectors. How this translates into relative occupational employment growth is shown in Figure 2. Overall, under the EGD scenario, the employment prospects of all occupations are improved, especially those in the middle of the occupational hierarchy (i.e., those considered particularly vulnerable to automation). The EGD scenario, if realised, is projected to bring about an additional 250,000 jobs for plant and machine operators and assemblers by 2030 and about 330,000 additional elementary jobs compared with the baseline. The EGD scenario also translates into a less rapid decline in employment for craft and related trades workers (a loss of around 290,000 jobs by 2030 compared with over 700,000 under the baseline projection). Cedefop reports that these are likely to cover additional employment needs in new recycling factories, construction of electric vehicle charging stations, and waste management facilities.

Figure 2: Cedefop's EGD and Baseline Scenarios



Source: Cedefop EGD Forecast (2021), based on Table 1, p.33. Available at: https://www.cedefop.europa.eu/files/4206_en.pdf.

The OECD's evaluation of the EU's Fit for 55 set of proposals designed to reduce the EU's target of reducing net greenhouse gas emissions by at least 55 per cent by 2030, reveals that it will increase demand as a result of technological adoption, relative to the baseline, for the following skills: interacting with computers; thinking creatively; analysing data and information; and communicating with persons outside an organisation (Borgonovi et al., 2023b). It also reveals that it will result in a

slightly higher rate of job loss for those working in blue collar and farm work compared with the baseline (a 3 per cent decrease in employment compared with a 2 per cent decrease under the baseline scenario).

Foresight studies complement quantitative forecasts of skill demand related to the green transition. Studies in the agri-food sector, for instance, have highlighted the need for people to acquire skills related to disease and pest control, the use of smart farming methods that require fewer inputs, the shift towards the production of new kinds of foodstuffs (e.g. new forms of protein), and management of water resources (Cedefop, 2023; ETF, 2024). While some of the skills the agri-food sector will increasingly require, such as data analysis, are common to a variety of sectors, there is a sector-specific aspect to them in many instances, such that the demand is for hybrid skills: i.e. a mix of skills required across all sectors (e.g., data collection and analysis) but which have sector specific dimension (e.g., undertaking data analysis in agriculture). As in the case of digitalisation, the impression is of piecemeal rather than radical change.

It is difficult to pinpoint with any degree of certainty the demand for skills which has, or will continue, to arise from the greening of the EU's economy. For the most part, the green transition or the concept of greening is difficult to define in the same way as, for example, technological change where it is possible to identify specific technologies, assess how they affect production processes, and then observe how this affects the task and skill requirements of workers. The impact of greening is conceptualised in much broader terms, such as with reference to sustainability. To date, some of the evidence on greening suggests that its impact on skills demand will be similar to that resulting from the digital transition: i.e. an increased demand for a range of technology /IT and data analysis related skills. Again, the evidence suggests that the scale of emerging skill demands might well be modest, except in the case of those sectors which are particularly sensitive to the green transition, such as those with particularly large carbon footprints, where the effects can be more substantial and sometimes highly localised.

2.5. Can Skills Supply Keep Pace with Demand?

The analysis so far has concentrated on how skill demand has changed and how it will develop in the future, especially in relation to the green and digital transitions. A supplementary question is whether skills supply can keep pace with demand. There is evidence in the EU of persistent labour shortages (ELA, 2024). The extent to which labour shortages result from skills shortages or simply reflect firms not offering the going terms and conditions of employment to attract and retain staff is difficult to determine, partly because skill mismatches prove challenging to measure in practice (Brunello and Wruuck, 2019). Skill mismatches are typically defined with reference to the difficulties employers face recruiting people with the skills, qualifications or experience they require to fill a job vacancy (external mismatches), or the extent to which employees' skills are matched to the requirements of their current job (internal mismatches).

Skill mismatches result from shifts in the economic cycle and structural factors. As the EU economy recovered from the pandemic, vacancy levels rose, and with it, employers' reports of labour and skills shortages. Eurobarometer (2023) observed that 53 per cent of micro companies, 65 per cent of small companies, 68 per cent of medium-sized companies, and 72 per cent of large companies faced difficulties finding the skills they required. There may well be a strong business cyclical effect driving these reports of skill shortages as the EU economy recovered from the pandemic. But even before the pandemic, a sizable share of employers faced difficulties recruiting people with the skills they required. In 2019, the European Company Survey highlighted that 77 per cent of employers found it difficult to recruit people with the skills they required (26 found it very difficult, and 51 per cent fairly difficult). The

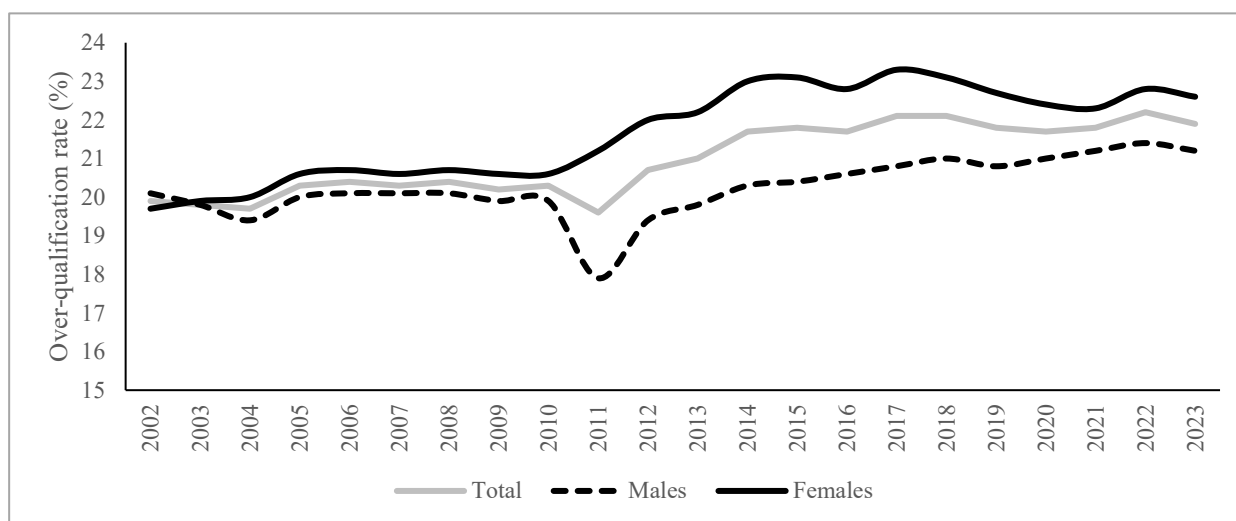
authors added a caveat that some difficulties may have been encountered because of the complex recruitment procedures some employers used (Eurofound /Cedefop, 2020). Just because an employer reports difficulties recruiting people with the skills they want, does not necessarily mean that there is a skill shortage. Analysis which has been able to separate the shortage of skills in the external labour market from other factors, such as offering relatively poor working conditions, suggests that between 60 and 80 per cent of reports of skill shortage from employers may well derive from other non-skill related features of employment in the workplace (Cedefop, 2015).

If attention is focused on internal skill gaps, the problem would appear to be more one of skill surpluses than skill shortages. Cedefop's second European Skills and Jobs Survey found relatively high levels of over-qualification in the EU workforce. Its results revealed:

- around 28 per cent of the EU workforce is over-qualified (i.e., had higher levels of education than their job required), with 17 per cent affected by 'severe' over-qualification, meaning that they are employed in jobs substantially below their level of education;
- 12 per cent of workers are under-qualified, with 8 per cent 'severely' under-qualified (Cedefop, 2022a).

These results are based on workers' assessments of their own situation, so there is a need for a degree of circumspection when interpreting these figures as evidence of skills shortages. A slightly more objective, though by no means a perfect measure of over-qualification, is the percentage of people with tertiary level educational attainment working in jobs other than managerial, professional, and associate professional ones. Over time, the measure shows that the over-qualification rate has increased, especially for women (see Figure 3). According to this indicator, a fifth (22 per cent) of the EU workforce with tertiary level educational attainment was over-qualified in 2023.

Figure 3: Rates of over-qualification in the EU, 2002-2023



Source: Eurostat Labour Force Survey [lfsa_eoqgan]. Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eoqgan/default/table?lang=en.

The results provided above refer to the recent past. An insight into potential future mismatches can be gleaned from Cedefop's future labour shortage indicator. The indicator ranges from 1 (weak or no shortage) to 4 (strong shortage). Table 3 shows that many likely future labour shortages are in elementary occupations. It seems reasonable to assume that the nature of these shortages is unrelated to skills. There are, however, occupations where skill is likely to be a key factor, such as the shortages projected for higher-skilled occupations, such as legal and business professionals.

Table 3: Future labour shortages are strongest in high-skilled, non-manual and elementary occupations

	ISCO	Occupation	Future shortage indicator
High-skilled non-manual occupations	11	Chief executives, senior officials and legislators	2.7
	13	Production and specialised services managers	2.7
	21	Science and engineering professionals	2.3
	22	Health professionals	2.7
	25	ICT professionals	2.0
	26	Legal, social and cultural professionals	2.7
	33	Business and administration associate professionals	2.7
	34	Legal, social, cultural and related associate professionals	3.0
Skilled non-manual occupations	42	Customer services clerks	2.7
	51	Personal services workers	2.7
	52	Sales workers	2.3
	53	Personal care workers	2.7
Skilled manual occupations	71	Building and related trades workers (excluding electricians)	2.3
	72	Metal, machinery and related trades workers	2.3
	74	Electrical and electronic trades workers	2.0
	82	Assemblers	2.7
	83	Drivers and mobile plant operators	2.7
Elementary occupations	91	Cleaners and helpers	3.3
	93	Labourers in mining, construction, manufacturing and transport	3.0
	94	Food preparation assistants	3.0
	95	Street and related sales and services workers	2.7
	96	Refuse workers and other elementary workers	3.0

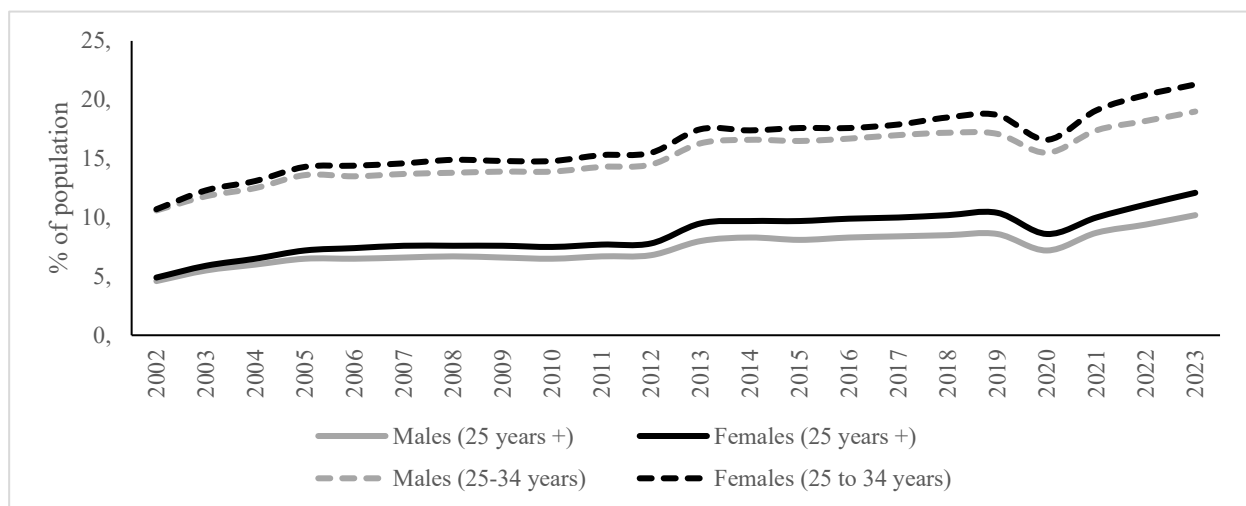
Source: Employment and Social Developments in Europe 2023, Table 2.4, p.49. Available at: <https://op.europa.eu/webpub/empl/esde-2023/chapters/chapter-2-2-2.html>.

In summary, there is a substantial volume of over-supply (or over-qualification) in the EU. This may simply reflect the fact that levels of educational attainment have increased across the EU, and the labour market takes time to absorb these skills. Nevertheless, the over-qualification rates, as shown in Figure 3, have proved to be persistent. This implies that there is a structural element to the observed mismatches. The costs of both skill surpluses and shortages are substantial. In the case of skill surpluses, the returns to education individuals accrue will be lower than they might have expected and are likely to have implications for job satisfaction where a job does not meet expectations. In the case of skill shortages, employers will lack the skills required to increase orders, introduce new technologies or move into new, potentially higher value markets. Shortages are also likely to place increased pressure on existing employees, which in turn may have a detrimental impact on staff turnover.

2.6. Human Capital Development in the EU

Both the digital and green transitions will entail workers to acquire new skills. This implies a need for training. Evidence from both the Adult Education Survey (AES) and the Labour Force Survey (LFS) reveals that participation in training has increased over time across the EU. Figure 4 shows a near continuous increase in the share of the workforce who reported that they engaged in training over the last four weeks. The AES records that just under half of the workforce engaged in training over the past 12 months in 2022. This is still some way short of the European Pillar of Social Rights Action Plan's 60 per cent target.

Figure 4: Participation in training over the last four weeks, 2002 to 2023



Source: Eurostat Labour Force Survey [trng_lfse_01]. Available at: https://ec.europa.eu/eurostat/databrowser/view/trng_lfse_01/default/table?lang=en.

The Continuing Vocational Training Survey (CVTS) reveals that small and medium sized enterprises are less likely to provide training⁴. In 2020, 63 per cent of enterprises with 10 to 49 employees provided continuing training to their employees compared with 93 per cent of those with 250 or more employees. Similarly, 29 per cent of enterprises with 10 to 49 employees had provided initial vocational training compared with 58 per cent of enterprises with 250 or more employees. Why smaller enterprises should engage less in training is difficult to pin down from the responses from the CVTS, but it sometimes reflects a lower level of demand (i.e. there are fewer people to train) and /or lack of

⁴ See Eurostat for data from the Continuing Vocational Training, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics_on_continuing_vocational_training_in_enterprises#How_many_enterprises_provide_CVT_to_the_ir_staff.3F.

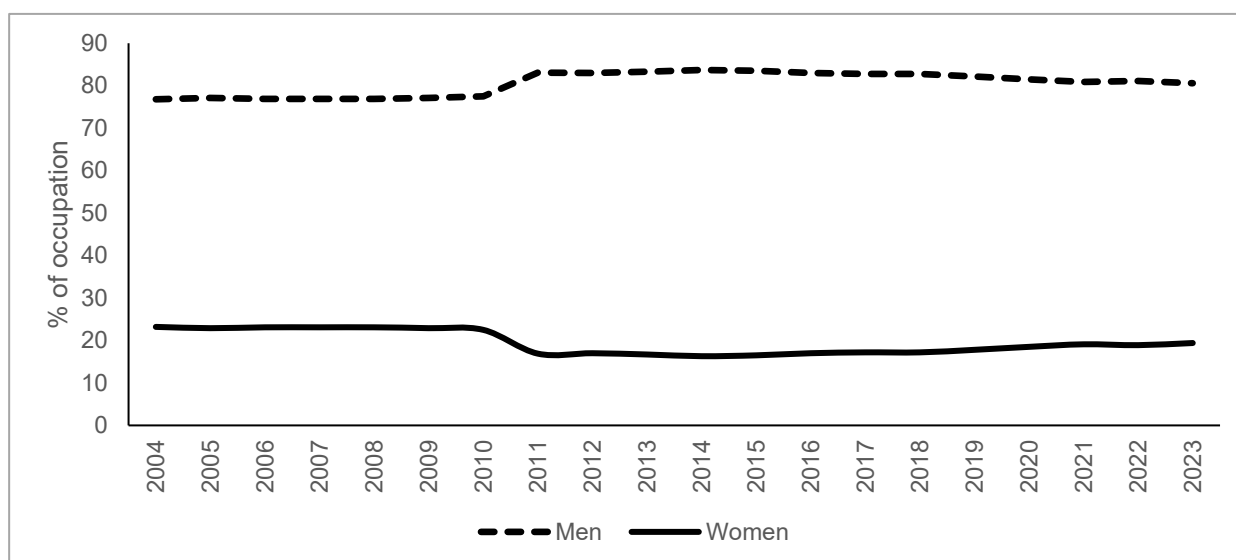
awareness of the value training can confer on an organisation.

The importance attached to training should not be under-estimated. Pouliakas (2018) noted that those whose jobs were most at risk of automation tended to be the ones who had limited or no access to training. Access to training is known to be unequal. Those who are highly educated or skilled are more likely to participate in training. This is, in large part, because training is typically provided via the employer, and employer training investments tend to favour those who are likely to generate the highest returns. It also tends to be innovative and high-productivity companies that are most likely to invest in workforce training because they have a genuine demand for higher-level skills (Pouliakas and Wruuck, 2022).

EU policy has tended to place a heavy emphasis on VET as being a relatively effective means to assist young people make the transition from education to work. In the EU, those in upper secondary education are more or less equally split between the vocational and general pathways. This has not changed much over time, except for small-scale growth in the percentage of students engaged in work-based vocational education and training. Notably, women are less likely to be in vocational education than men: 42 per cent of upper secondary school vocational students were women in 2022, and this has not changed much over the past five years. Despite attempts to improve the standing of the vocational pathway in post-compulsory education, with apprenticeships being subject to considerable praise as an effective means of connecting training to employment, it has proven difficult to persuade more young people to take this pathway. People still see vocational education as the 'poor relation' of general education even though its capacity to deliver positive employment outcomes is recognised. The result is that VET has high esteem but struggles to increase the level of participation (Cedefop, 2020; 2022).

The choices students make within the formal school system will have a strong influence on their future employment and skills profiles. In some fields, the EU labour market exhibits a relatively high degree of occupational segregation by gender. This can be traced back, in some instances, to the way in which the initial education and training system works. This is particularly evident in some science, technology, engineering and mathematics (STEM) jobs. The specialist areas of study which are required to enter these occupations are sometimes ones where women are under-represented. The impact is to reduce the potential skills supply available to the EU. One area where the EU has been particularly keen to increase labour supply is that of computer specialists. Figure 5 shows that women are substantially under-represented in the occupation with little signs of improvement in the situation.

Figure 5: Employment of computer specialists by sex, 2004 to 2023



Source: Eurostat Employed ICT specialists by sex [isoc_sks_itsps]. Available at: [https://ec.europa.eu/eurostat/databrowser/view/isoc_sks_itsps\\$defaultview/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/isoc_sks_itsps$defaultview/default/table?lang=en).

2.7. Skills, Training and Productivity

Improving the supply of skill so it better matches demand should, at face value, have some impact on economic performance. The evidence suggests that workers whose skills are matched to those required in their jobs tend to obtain higher wage returns than those whose skills are mismatched. This implies that their productivity levels are higher. International evidence, now rather dated, suggests that a 10 per cent increase in the total amount of training per employee can increase productivity by 2 per cent (Rincón Aznar et al., 2015). This does not necessarily mean that increasing the volume of training undertaken will generate productivity gains. Understanding how investments in skills yield a return to the worker and the firm making those investments requires an understanding of the workplace context. There is, it would seem, a virtuous circle of workplaces which exhibit relatively high levels of economic performance linked to human resource management (HRM) practices designed to support high performance working, including the provision of upskilling and reskilling to their workforces (Eurofound /Cedefop, 2020). Workplaces that invest in skills tend to be confident in retaining the services of the employees in which they invest. In this way, they can appropriate the return on their investment. In fact, the provision of continuing professional development and training may well be one of the factors which results in relatively low levels of labour turnover. But these are not necessarily typical workplaces; they tend to be high performing ones. Accordingly, there is no guarantee that if other firms were willing to invest in skills to the same degree, they would obtain the same returns. The various product market strategies and human resource policies, which are an integral part of a high-performance work organisation associated with the accumulation of relatively high returns, may not be in place. This emphasises the importance of understanding the workplace context in stimulating both skills demand and skills supply.

2.8. A Changing Labour Market Environment

There are different views about how the labour market might develop in the future. There are stories about portfolio careers where workers are increasingly mobile, moving between jobs on a fairly regular basis. To some extent, this will reflect both precariousness in the labour market and the career choices of individuals. It implies a reduced importance for the internal labour markets, which provide people

with career progression within the same employer. This has implications for the provision of training. If labour markets become more fluid with people moving between jobs and employers, the opportunities for employers to recoup their skill investments may dissipate, and with it, their willingness to provide skills development. This may be exaggerated. Labour turnover and the incidence of temporary and self-employment have not shown much change over the recent past⁵. So, concerns about the demise of the traditional employment relationship may be premature.

A relatively new form of employment relationship that has attracted much attention is platform work, where the matching of demand and supply of paid work is undertaken through online platforms. Eurostat estimates that around 3 per cent of individuals in the EU have undertaken at least one hour of work arranged via a platform in the last month (Eurostat, 2024a). For the most part, these are people already in employment (87 per cent) which may suggest that their training needs are being taken care of by their employer. It tends to be younger, more highly educated people who appear to engage in this form of work, a group that, on average, has relatively good access to training (Otto and Lehdonvirta, 2018). Platform work, however, is not necessarily highly skilled work. The Joint Research Centre's Algorithmic Management and Platform Work Survey (AMPWork) found that platform working was often in relatively low skilled activities such as: data entry, taxi driving, food and goods delivery, housekeeping, and handy /repair work (Fernández-Macías et al., 2023).

As platform work continues to develop, it will be important to anticipate and prepare for its potential implications for worker access to upskilling and reskilling. Proactive measures may be necessary to ensure that those outside the traditional employer-employee relationship are adequately trained for the future.

2.9. Conclusion

Overall, the evidence suggests that over the medium-term, there will not be much change in the occupational structure of employment. There will be, however, changes within jobs. The evidence increasingly and consistently shows that the digital transition, and to a lesser extent, the green one, will bring about changes in the task content of existing jobs. Workers will need to acquire new skills to augment and /or replace existing ones. Although the evidence reveals the relatively benign effects of the twin transitions on employment and skills demand, the scale of future changes is far from clear. The history of technological change – or that of greening – suggests that it increases incrementally. This may be good news for education and training systems insofar as the need to manage rapid, radical change is reduced. Nevertheless, it still suggests that there may well be significant future demand for reskilling and upskilling as the twin transitions gather pace.

As well as being able to meet the demands of the twin transitions, skills policy also needs to address existing problems. A sizable share of employment in the EU is in relatively low skilled elementary occupations. These jobs will continue to be a relatively important source of employment over the medium-term, but there is often little potential for their incumbents to move into higher skilled, higher waged employment. Skill mismatches pose a problem, too. Skill systems across the EU have struggled to meet the current demand for skills. A substantial share of the workforce is over-qualified for the jobs they undertake, and while skill shortages are far from endemic, there are parts of the economy, often in the relatively highly skilled parts, where they are evident.

⁵ For labour turnover statistics, see Cedefop's estimates of recently hired workers, available at: <https://www.cedefop.europa.eu/en/tools/skills-intelligence/recently-hired-workers?year=2011&country=EU#1>. Eurostat provides estimates of self-employment, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Self-employment_statistics. In 2013, 14.6 per cent of those in employment were self-employed, compared with 13.0 per cent in 2023.

Participation in training provides both firms and individuals with a degree of resilience vis-à-vis future change. Where workers are relatively well skilled and have access to training to update their competences, this should lower the adjustment costs faced by firms in responding to the digital and green transitions. It should also provide individual workers with a degree of protection from any changes in their current job's task requirements. Where the returns to training, for both the employer and the worker, are highest is where it responds to demand. Training for training's sake is unlikely to deliver returns to either employer or worker. Ultimately, the demand for skills and training depends on firms' product market strategies. There is, perhaps, a need to consider whether the current level of demand for skills should be higher – to achieve higher skills equilibrium – and, if so, whether skills systems would be able to satisfy that demand. This may warrant closer integration of skills policy with industrial strategy.

The next chapter focuses on how the EU has sought to address many of the issues and challenges outlined above.

3. EU SKILLS INITIATIVES

KEY FINDINGS

EU skills policy provides near comprehensive coverage of the challenges posed by the triple digital, green and demographic transitions.

Policy making has been wide ranging and addresses: how individuals' access to reskilling and upskilling can materialise; the matching of people's skills to labour market demand; and how the VET system can be enhanced to meet changing skill demands.

The various initiatives deployed at the EU level can be grouped into multiple categories, the main ones used in this study are: strategic interventions, regulatory initiatives, cooperation and awareness rising, EU tools for delivery of skills, and digital skills initiatives. Consideration is also given to the financial resources to support the implementation of national and EU-wide interventions.

The heterogeneous situation among the EU MS and the gaps in adult participation compared with the EU headline target (i.e., at least 60 per cent of adults participating in training every year by 2030) indicate a strong need to boost the efforts and initiatives that support lifelong learning through upskilling and reskilling opportunities delivering the skills required in the future.

There is also a pressing need to focus on how policies can be implemented, especially regarding the incentives that encourage employers to train. This remains a crucial aspect that requires more attention and further research.

Policy making on skills and VET at a pan-European level stretches back to the foundations of the European Union. The Treaty of Rome (1957), which established the European Economic Community (EEC), recognised the need for concerted actions on skills. The Treaty on the Functioning of the European Union (TFEU) provides the current legal framework in this area and includes the following provisions:

- **Article 9:** *'In defining and implementing its policies and activities, the Union shall take into account requirements linked to the promotion of a high level of employment, the guarantee of adequate social protection, the fight against social exclusion, and a high level of education, training and protection of human health.'*
- **Article 165:** *'The Union shall contribute to the development of [high] quality education by encouraging cooperation between Member States and, if necessary, by supporting and supplementing their action, while fully respecting the responsibility of the Member States for the content of teaching and the organisation of education systems and their cultural and linguistic diversity.[...]*
- **Article 166:** *'The Union shall implement a vocational training policy which shall support and supplement the action of the Member States, while fully respecting the responsibility of the Member States for the content and organisation of vocational training. [...]*

In addition, the Treaty of Lisbon gave legal effect to the Charter of Fundamental Rights of the European Union⁶, which states in **Article 14** that *'Everyone has the right to education and to have access to vocational and continuing training. [...]*

⁶ The Charter of Fundamental Rights of the European Union, available at: https://www.europarl.europa.eu/charter/pdf/text_en.pdf.

The previous section provided a synopsis of emerging skill needs across the EU, together with an assessment of how these are likely to develop over the next ten years or so. Here, the analysis turns to how responsibilities conferred on the EU by Articles 9, 165 and 166 of the TFEU have been used to develop strategies, policies and tools to improve the supply of skills. This proves to be an active area of policy making. For this reason, the assessment is limited to activities over the past five years, which directly address improvements to skills supply to better meet emerging demands.

Before providing an assessment of the EU skills policy, its development over the past five years is summarised. Consideration is given to:

1. EU strategies and action plans;
2. regulatory interventions (mainly the adoption of Recommendations);
3. cooperation and awareness rising initiatives;
4. initiatives and EU tools for delivery of skills;
5. digital skills initiatives; and
6. financial support.

Each of these is now considered in turn.

3.1. Strategic interventions and action plans

3.1.1. European Pillar of Social Rights

At the EU level, the European Pillar of Social Rights (EPSR) guides the multiple European initiatives in the social sphere, including those related to skills. The first principle, **education, training and life-long learning**, states that *'Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market.'*⁷ This principle sets the framework for the actions and initiatives to enhance the skills level of European citizens and prepare them to navigate current and future labour market realities.

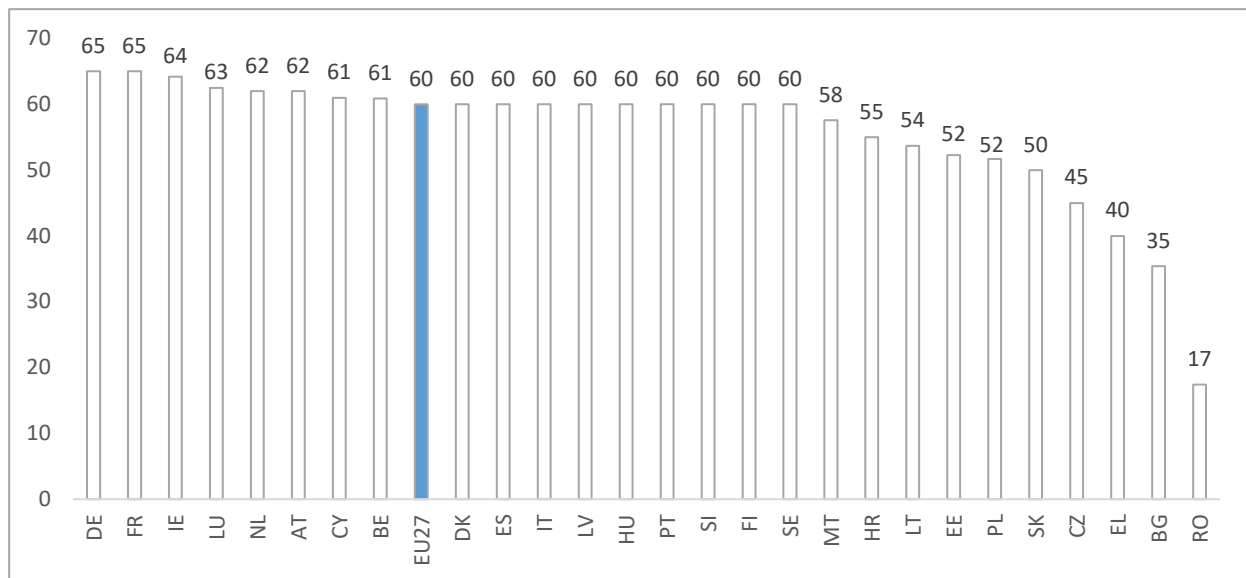
The 2021 EPSR Action Plan⁸ includes specific measures designed to put into practice the principles and rights of the EPSR, which represent an essential part of building fair and well-functioning labour markets and welfare systems in the EU. The Action Plan established a set of headline commitments, namely the targets for at least 60 per cent of adults participating in training every year and an employment rate of at least 78 per cent of the population aged 20 to 64, and to support the digital transition, at least 80 per cent of those aged 16-74 should have basic digital skills (European Commission, 2021a). In 2023, the percentage of the population aged 16-74 years who had basic or above basic overall digital skills was 56 per cent (below the target of 80 per cent by 2030)⁹. The Adult Education Survey (AES) for 2022 reveals that approximately 47 per cent of adults aged 25 to 64 participated in education and training in the last 12 months in the EU – i.e., below the 60 per cent target (Eurostat, 2024b). Each Member State has set its own national target for adults' participation in training every year by 2030, with 17 being equal to or greater than the EU-wide commitment set in the EPSR Action Plan (see Figure 6).

⁷ The European Pillar of Social Rights, available at: <https://ec.europa.eu/social/main.jsp?catId=1606&langId=en>.

⁸ The European Pillar of Social Rights Action Plan, available at: <https://op.europa.eu/webpub/empl/european-pillar-of-social-rights/en/>.

⁹ The Social Scoreboard, available at: <https://ec.europa.eu/eurostat/web/european-pillar-of-social-rights/scoreboard>.

Figure 6: National commitments for 2030 (Headline target regarding adults' participation in training every year)



Source: Own elaboration based on European Commission (2022). Available at: <https://ec.europa.eu/social/BlobServlet?docId=25728&langId=en>.

3.1.2. European Skills Agenda

The European Skills Agenda¹⁰ represents the general framework for coordinating EU skills policy. The latest agenda sets out a strategic framework for the 2020 to 2025 period. It specifies the initiatives, objectives, and financial resources to assist individuals and companies access the skills they need. At its core is the principle of social fairness, the implementation of the EPSR principle on **education, training and life-long learning**, improving the EU's competitiveness via the twin green and digital transitions, and strengthening resilience to face various challenges and crises (European Commission, 2020). The specific actions set out in the Skills Agenda are as follows.

- **Action 1: A Pact for Skills** – to provide a collaborative platform for the active involvement of all stakeholders to enhance cooperation and investment in skills for all working age people across the EU.
- **Action 2: Strengthening skills intelligence** – improving skills anticipation through, amongst other things, increasing social partner involvement in labour market projections and identification of training needs.
- **Action 3: EU support for strategic national upskilling action** – boosting efforts to establish /update skills strategies at the MS level to guide actions and measures designed to deliver skills which are in demand.
- **Action 4: Council Recommendation of 24 November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience** – using the measures suggested to strengthen VET systems in the MS to provide skills that enhance learner employment opportunities.

¹⁰ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Skills Agenda for sustainable competitiveness, social fairness and resilience, Brussels, 1.7.2020, COM (2020) 274 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0274>.

- **Action 5: Rolling out the European Universities Initiative and upskilling scientists** – increasing cooperation at the Higher Education (HE) level and with other stakeholders to equip students with the skills needed in the future and enhancing EU researchers' skills by developing the European Competence Framework for Researchers (ResearchComp¹¹).
- **Action 6: Skills to support the twin transitions** – gathering various EU-level initiatives that support the understanding and development of green and digital skills, such as the new taxonomy of skills for the green transition¹², the European sustainability competence framework (GreenComp¹³), the updated Digital Education Action Plan to enhance digital skills detailed in Section 3.1.3, and the Council Recommendation on improving the provision of digital skills and competences in education and training covered in Section 3.2.5.
- **Action 7: Increasing STEM graduates and fostering entrepreneurial and transversal skills** – focusing on boosting participation in STEM topics, including through initiatives to increase female participation in STEM-related studies and careers, stimulating entrepreneurial skills development and the use of the European Entrepreneurship Competence Framework (EntreComp¹⁴), and on recognising and validating transversal skills by employers and employment services.
- **Action 8: Skills for life** – prioritising comprehensive, high quality, and inclusive adult learning systems to reach all individuals, including seniors, and support non-formal, life-wide, inter-generational, inter-cultural, and community learning activities.
- **Action 9: Initiative on individual learning accounts** – focusing on promoting individual learning accounts as an option for overcoming some of the challenges of participating in training activities, such as cost and awareness of the need and opportunities to train. This action led to the 2022 Council Recommendation on Individual Learning Accounts (see Section 3.2.3).
- **Action 10: A European approach to micro-credentials** – supporting initiatives that ensure quality, transparency, and the take-up of micro-credentials across the EU, as well as inclusion in national qualifications frameworks. In 2022, the Council adopted the recommendation on a European approach to micro-credentials for lifelong learning and employability (see Section 3.2.4).
- **Action 11: New Europass platform** – strengthening the role of the Europass platform in supporting people in managing their careers, including the provision of advice related to jobs and courses tailored to their skills.
- **Action 12: Improving the enabling framework to unlock Member States' and private investments in skills** – focusing on developing various actions that can support and increase public and private investment in skills and human capital.

¹¹ ResearchComp: The European Competence Framework for Researchers, available at: https://research-and-innovation.ec.europa.eu/jobs-research/researchcomp-european-competence-framework-researchers_en.

¹² Green Skills and Knowledge Concepts: Labelling the ESCO classification, available at: <https://esco.ec.europa.eu/system/files/2023-07/Green%20Skills%20and%20Knowledge%20-%20Labelling%20ESCO.pdf>.

¹³ GreenComp: the European sustainability competence framework, available at: https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en.

¹⁴ EntreComp: The Entrepreneurship Competence Framework, available at: <https://publications.jrc.ec.europa.eu/repository/handle/JRC101581>.

The European Skills Agenda established **four objectives, to be achieved by 2025**, to assess progress towards achieving its ambition (see Table 4).

Table 4: The objectives set in the European Skills Agenda and the latest data available

Objective for 2025	Latest data available
50% level for the participation of adults aged 25-64 in learning during the last 12 months	46.6%*
30% level for the participation of low-qualified adults 25- 64 in learning during the last 12 months	25.1%*
20% the share of unemployed adults aged 25-64 with a recent learning experience	14.1%**
70% the share of adults aged 16-74 having at least basic digital skills	56%***

Source: European Skills Agenda. *Data for 2022 from the adult education survey, online data code: trng_aes_102. **Data for 2023 from Labour force survey, online data code: trng_lfse_02. ***Eurostat 2023, online data code: isoc_sk_dskl_i21.

3.1.3. Digital Education Action Plan

The Digital Education Action Plan¹⁵ is designed to enhance the quality, inclusivity and accessibility to digital education, to support the adaptation of Member States' education and training systems to the digital era, and to increase participation in digital skills training. It also supports various actions set out in the European Skills Agenda and the EPSR Action Plan.

The plan includes specific initiatives to enhance the level of digital skills, such as:

- Council Recommendation on improving the provision of digital skills in education and training (see Section 3.2.5);
- Council Recommendation on the key enabling factors for successful digital education and training (see Section 3.2.6);
- updating the European Digital Competence Framework to include AI and data-related skills, which was completed with the publication of the Digital Competence Framework (DigComp 2.2) in 2022¹⁶;
- introduction of the European Digital Skills Certificate (EDSC). Various measures are in place to establish the EDSC, including a pilot project to identify minimum quality requirements to support the transparency, acceptance, and mutual recognition of the certificate;
- providing Digital Opportunity Traineeships to VET and HE students /recent graduates to enhance their digital skills (with the support of Erasmus+);

¹⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Digital Education Action Plan 2021-2027 Resetting education and training for the digital age*, Brussels, 30.9.2020, COM(2020) 624 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624>.

¹⁶ DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes, available at: <https://publications.jrc.ec.europa.eu/repository/handle/JRC128415>.

- increasing female participation in STEM education and training. This includes support to 40,000 young female students by 2027 to participate in training on the circular economy and digital skills, and organising various events to promote female participation in STEM education and training.

3.1.4. Labour and Skills Shortages in the EU: An action plan

As indicated in the previous chapter, labour shortages have been a persistent feature of the EU labour market, at least since the pandemic induced economic lockdowns were relaxed. The Labour and Skills Shortages in the EU Action Plan¹⁷ is designed to support:

1. the activation of under-represented people in the labour market;
2. **providing support for skills development, training and education;**
3. improving working conditions in specific sectors;
4. improving fair intra-EU mobility; and
5. attracting talent from outside the EU.

These are seen as essential for consolidating sustainable economic growth in the EU, helping people and businesses with green and digital transitions, creating new employment opportunities, and boosting economic and social resilience (European Commission, 2024a). Future European Commission actions will focus on financing new projects on activating and upskilling young people not in education, employment or training (NEET), co-financing the establishment of Centres of Vocational Excellence (with a target of at least 100 by 2027), developing new skills partnerships under the Pact for Skills, supporting the work of Skills Academies, and improving skills intelligence system with the support of various EU agencies (i.e., Cedefop, Eurofound and European Labour Authority). In addition, the social partners will contribute to the outcomes of the Action Plan by supporting access to apprenticeships and strengthening partnerships between VET providers and employers, including setting up sectoral training centres (European Commission, 2024b).

3.2. Regulatory interventions

The regulatory interventions are nearly all recommendations. According to Article 228 of the TFEU, these are non-binding acts by which the European Union means to achieve certain ends without imposing a mandatory legal framework. The main recommendations adopted over the past five years in relation to skills are summarised below. In addition, mention should also be made of earlier recommendations, including the Recommendation on Key Competences for Lifelong Learning¹⁸ (2018), which identifies eight key competences needed for, amongst other things, employability, active citizenship and social inclusion. The Recommendation provides a common European reference framework for key competences for use by policymakers, education and training providers, social partners and learners themselves. In addition, the Recommendation on Upskilling Pathways¹⁹ (2016) was introduced to provide low skilled /qualified adults with a skills assessment, tailored provision of accredited training, and guidance and support measures in order to improve their skills levels,

¹⁷ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Labour and skills shortages in the EU: an action plan, Brussels, 20.3.2024, COM(2024) 131 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0131>.

¹⁸ Council Recommendation of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01). Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)).

¹⁹ Council Recommendation of 19 December 2016 on Upskilling Pathways: New Opportunities for Adults (2016/C 484/01). Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016H1224\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016H1224(01)).

employability, and progression in the labour market.

3.2.1. Council Recommendation on A Bridge to Jobs – Reinforcing the Youth Guarantee

The Youth Guarantee (YG) is a commitment by all Member States to ensure that all **young people under the age of 30** receive a good quality offer of employment, continued education, apprenticeship, or a traineeship within a period of four months of becoming unemployed or leaving education. Since 2014, all MS have introduced various measures and actions to provide support to young people in line with the YG. The Reinforced Youth Guarantee²⁰, adopted in 2020, steps up the comprehensive job support available to young people and extends the focus to those under 30 years of age. The initiative is designed to assist millions of young people at risk of unemployment, with particular reference to hard-to-reach groups (e.g., those who are NEET, young people in rural areas, etc.). It provides tailored, individualised approaches, providing young people with the appropriate levels of guidance and directing them towards crash courses or boot camps if upskilling proves to be necessary. The various actions and measures implemented at the MS level as part of the YG are supported by financial resources from NextGenerationEU and the long-term EU budget, notably the European Social Fund Plus 2021 – 2027 programming period. In the previous programming period, 2014 – 2020, the implementation of YG initiatives was supported through the Youth Employment Initiative (YEI) with a total budget of EUR 10.5 billion (i.e., EU resources and national co-financing). By the end of 2022, 3.9 million participants (49 per cent women) were registered in various measures financed by YEI. The majority of participants were unemployed young people (82 per cent), below the age of 25 years (72 per cent), and with a low or medium level of education (i.e., 34 per cent with primary or lower secondary education, and 41 per cent with upper secondary or post-secondary education). Additionally, people from rural areas represented 15 per cent of participants; other disadvantaged persons 15 per cent; and migrants, participants with a foreign background, and minorities represented 13 per cent of participants (European Commission, 2024q).

3.2.2. Council Recommendation on Vocational Education and Training (VET) for Sustainable Competitiveness, Social Fairness and Resilience

The Council Recommendation on VET²¹ from 2020 outlines the guidelines for ensuring that VET becomes flexible, adjusts quickly to the demands of the labour market, and provides adults and young people with high-quality learning opportunities. It emphasises enhanced quality assurance, expanding the options for work-based learning and apprenticeships. The recommendation defines three specific EU-level objectives to be reached by 2025 (see Table 5).

²⁰ Council Recommendation of 30 October 2020 on A Bridge to Jobs – Reinforcing the Youth Guarantee and replacing the Council Recommendation of 22 April 2013 on establishing a Youth Guarantee (2020/C 372/01). Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1104\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1104(01)).

²¹ Council Recommendation of 24 November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience 2020/C 417/01. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1202\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1202(01)).

Table 5: Objectives set and the latest data available for the VET system

Objectives for 2025	Latest data available
82% share of employed graduates from VET aged 20-34 who have graduated 1-3 years ago from upper secondary or post-secondary non-tertiary VET	81%*
60% of recent graduates from VET benefiting from exposure to work-based learning during VET (20-34 year olds who left education and training 1-3 years ago)	63%**
8% of learners in VET benefiting from learning abroad (i.e., the share of mobile learners in a calendar year, as a percentage of a cohort of VET graduates in the same year)	-

Source: Council Recommendation on Vocational Education and training (VET) for sustainable competitiveness, social fairness and resilience. *Data for 2023 from Labour Force Survey, Online data code: edat_lfse_24. **Data for 2023 from Labour force survey, online data code: edat_lfs_9919.

Cedefop's evaluation of the way this recommendation was implemented observed that all EU MS have developed National Implementation Plans (NIPs), which guide their VET policies by focusing on common EU priorities and national ones. It was highlighted that more is needed to support the green transition given that few NIPs included specific measures to develop green skills (Cedefop, 2024a).

3.2.3. Council Recommendation on Individual Learning Accounts

The Recommendation on Individual Learning Accounts (ILAs)²² from 2022 supports MS initiatives targeted at increasing the participation of adults in training and reducing skills gaps. It provides individuals with the right to access a given amount of funded training. ILAs can be used to access training, guidance and counselling, skills assessment or validation opportunities, and strengthen individuals' motivation to engage in training and learning activities. So far, 15 MS have used EU financial resources to develop ILAs and improve access and participation in skills development activities (European Union, 2024). The implementation of this recommendation is still in its early stages, with some MS conducting pilot studies to assess how ILAs can improve their training systems (European Commission and Cedefop, 2024).

3.2.4. Council Recommendations on a European approach to Micro-credentials for Lifelong Learning and Employability

Micro-credentials certify the learning outcomes of short-term learning experiences. Short courses ease individuals' access to training by reducing barriers such as not having the time available to train when courses are of relatively long duration. The recommendation on a European approach to Micro-credentials for Lifelong Learning and Employability²³ (2022) is designed to support participation in lifelong learning through providing flexible education and training. In doing so, it potentially reduces the barriers to accredited training that some groups might otherwise face. The recommendation defines mandatory elements of a micro-credential to ensure recognition in and between MS. Cedefop's research observed that most MS already had in place measures providing access to short duration education and training activities similar to micro-credentials and identified the quality assurance of

²² Council recommendation of 16 June 2022 on individual learning accounts (2022/C 243/03). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32022H0627%2803%29>.

²³ Council Recommendation of 16 June 2022 on a European approach to micro-credentials for lifelong learning and employability (2022/C 243/02). Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627\(02\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(02)).

such systems as an essential feature in their successful roll-out (Cedefop, 2022b).

As a recent initiative, little information on the impact of micro-credentials is available, as most EU MS are still assessing the implications of the recommendation for their training systems. Cedefop's analysis notes that VET stakeholders in the MS recognise the potential micro-credentials provide to support the labour market integration of vulnerable groups such as migrants, early leavers from education and training, and persons with disabilities (Cedefop, 2024b; Poulidou, 2024).

3.2.5. Council Recommendation on Improving the Provision of Digital Skills and Competences in Education and Training

The Recommendation on Improving the Provision of Digital Skills and Competences in Education and Training²⁴ (2023) was adopted to support the digital transition and address the growing need for people to acquire digital skills and competencies to keep pace with transformations in the labour market and society. It enhances the actions and measures at the MS level by: supporting the development of strategic frameworks for digital education, skills and competences; setting or reviewing national objectives and targets for the provision of digital skills and competences; strengthening efforts to target hard-to-reach groups such as persons in the rural areas, persons with disabilities, Roma, and third country nationals; enhancing digital skills and competences of all students in VET, HE and adult training; expanding the opportunities to acquire advanced digital skills; increasing cross-curricular approaches that combine digital skills with other subjects; and addressing the shortage of ICT professionals.

The recommendation is in the early stages of its implementation with no information available about its impact. That said, the importance of boosting digital competences is underlined by the findings from the second European Skills and Jobs Survey, which highlighted that 39 per cent of EU workers considered themselves as digitally under-skilled to a moderate extent, and 13 per cent to a great extent (Bertoni et al., 2024).

3.2.6. Council Recommendation on the Key Enabling Factors for Successful Digital Education and Training

The Recommendation on the Key Enabling Factors for Successful Digital Education and Training²⁵ (2023) complements the provisions in the Recommendation on Improving the Provision of Digital Skills and Competences in Education and Training by supporting MS: to enhance the efficiency, effectiveness and resilience of digital education and training policy; strengthen digital training and capacity building activities in this area; encouraging the digital transformation of education and training institutions; and promoting high-quality, resilient and inclusive digital education and training. Both digital skills recommendations stand out as recent initiatives that strengthen EU and MS level frameworks to support adaptation to the digital transition and assist workers acquire digital skills. Similar to the recommendation described in Section 3.2.5, MS are only just starting to develop actions for implementing this recommendation.

3.2.7. Communication on Attracting Skills and Talent to the EU

The EU has had a focus on reducing labour and skills shortages by attracting qualified individuals who are third-country nationals. These initiatives were presented in the Commission Communication

²⁴ Council Recommendation of 23 November 2023 on improving the provision of digital skills and competences in education and training (C/2024/1030). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C_202401030.

²⁵ Council Recommendation of 23 November 2023 on the key enabling factors for successful digital education and training (C/2024/1115). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C_202401115.

Attracting Skills and Talent to the EU²⁶ (2022) and included **Talent Partnerships** with selected third countries and a proposal for establishing **EU Talent Pool**. The **Talent Partnerships** initiative will build on various pilot projects implemented to increase the mobility of third country nationals to study, work and train in the EU. The European Commission (EC) Communication announced the future establishment of partnerships with North African partner countries by the end of 2022. Details, however, regarding the progress of partnerships could not be identified. The **EU Talent Pool** initiative is designed to develop an EU-wide matching tool that can assist in attracting and increasing the mobility of skilled workers from non-EU countries and support EU employers in filling their vacancies. This initiative expands on the EU Talent Pool Pilot (with eight MS), which assisted people from Ukraine seeking safety in the EU to find employment (EURES, 2023). The proposal for a Talent Pool is still in the process of being agreed. The proposal could facilitate MS efforts to address existing and future labour and skills shortages and enhance legal and safe migration from third countries. However, the initiative has to strike a balance between facilitating access of EU businesses to skilled non-EU workers and not accentuating the 'brain drain' faced by some third countries.

3.3. Cooperation and awareness raising initiatives

3.3.1. Pact for Skills

The **Pact for Skills** was launched in 2020 and represents one of the key actions of the European Skills Agenda. It brings together public and private organisations to invest in upskilling and reskilling (European Commission, 2024c). The Pact for Skills gathers stakeholders – such as national, regional and local institutions; social partners; cross-industry and sectoral organisations; chambers of commerce; education and training providers; research institutions; employment services providers and businesses – and helps them to coordinate their efforts to increase overall skill levels. Currently, there are around 2,500 signatories to the Pact (European Commission, 2024d). To support and strengthen the activities of those involved in the Pact, three Hubs have been developed.

- **The Networking Hub**, which facilitates matching between organisations that share the same skills-related objectives. It organises online networking events and bridges the connection with national and regional policymakers.
- **The Guidance Hub**, which aims to strengthen regional and large-scale partnerships by defining and identifying financing opportunities and implementing activities to achieve their commitments.
- **The Knowledge Hub**, which organises various events and peer learning activities on skills-related topics, and provides an online database of EU and national funding opportunities and information on EU skills policies, learning resources, and successful practices.

To date, the Pact for Skills has facilitated the development of over 34,000 training programmes and the participation in upskilling and reskilling of 3.5 million people (European Commission, 2024e).

3.3.2. Blueprint Alliances

In the period 2018 – 2021, 21 **Blueprint Alliances** were financed and developed. The Alliances brought together companies, social partners, research institutions, education and training providers and public authorities to concentrate their efforts in a concerted fashion to develop sectoral skills strategies,

²⁶ European Commission (2022). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Attracting skills and talent to the EU*, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0657>.

conduct sectoral skills intelligence studies, map skills supply, and work on improving skills supply (European Commission, 2023b). This initiative continues under the 2021 – 2027 Erasmus+ programme through the **Alliances for Sectoral Cooperation on Skills**. In the period 2022 – 2023, 19 projects supporting sectoral Alliances were selected for funding that will develop various activities to help companies and workers in various sectors (e.g., digital, renewable energy, automotive, agri-food, electronics, social economy, textile, retail, health and others) to acquire those skills which will allow them to adapt to future change in the demand for skills (European Commission, 2024f).

3.3.3. European Alliance for Apprenticeships

The **European Alliance for Apprenticeships** (EAfA)²⁷ represents a stakeholder cooperation platform established in 2013 to enhance the quality, availability, and attractiveness of apprenticeships and encourage the mobility of apprentices in the EU, EFTA, and candidate countries. Stakeholders participating in the EAfA include national, regional and local authorities; companies (both large ones and SMEs); social partner representative organisations; chambers of industry, commerce and crafts; education and training providers; and youth and non-profit organisations, research institutes, and think tanks. The six priorities of the EAfA are to: (i) encourage commitment to high quality apprenticeships; (ii) support SMEs in providing apprenticeship opportunities; (iii) mobilise local and regional authorities in helping businesses engage with apprenticeships; (iv) strengthen social dialogue and involvement of social partners in the apprenticeship system; (v) increase the role of European sectoral committees and development of joint sectoral cooperations; and (vi) relaunch the European Apprentices Network to support apprentice representation in MS (European Commission, 2021b). Between 2013 and 2024, over 3,000 pledges were registered from stakeholder organisations to increase the provision of apprenticeships, which covered around 2.7 million apprenticeship places (European Commission, 2024g).

3.3.4. The European Year of Skills

The **European Year of Skills**²⁸ was an initiative which ran between 9 May 2023 and 8 May 2024 across the EU. It raised awareness about the European Skills Agenda by organising events and strengthening activities designed to equip people with skills. During the European Year of Skills, more than 2,000 events were organised across the EU. It created a high level of awareness on skills-related topics through campaigns across a range of traditional and social media (European Union, 2024). EU-level agencies implemented various initiatives financed through EU programmes (e.g., Horizon Europe, Digital Europe, EU4Health) that contributed to skills development (HaDEA, 2024).

3.4. The delivery of skills

3.4.1. Centres of Vocational Excellence

The **Centres of Vocational Excellence** (CoVEs) are partnerships of VET providers, companies, local and regional authorities and other stakeholders that develop local skills ecosystems designed to provide high-quality vocational skills to young people and adults, stimulate business development by working with SMEs, promote research, and support entrepreneurial initiatives in various parts and economic sectors of the EU (European Commission, 2024h). The activities of CoVEs focus on developing and

²⁷ Initiative launched in a joint declaration of the European Social Partners (ETUC, BusinessEurope, UEAPME and CEEP), the European Commission and the Presidency of the Council of the EU. Available at: https://www.consilium.europa.eu/media/31665/joint-declaration_apprenticeships.pdf.

²⁸ Decision (EU) 2023/936 of the European Parliament and of the Council of 10 May 2023 on a European Year of Skills. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023D0936>.

implementing innovative teaching and training methods, enhancing cooperation and partnership, and ensuring adequate governance and funding for the various initiatives (European Commission, 2019a).

The development and activities of CoVEs are supported by the Erasmus+ Programme under Key Action 2 – Cooperation among organisations and institutions. In the period 2019-2023, 53 CoVEs projects were funded with a budget allocation of 183 million Euros, most of them targeting the green and digital transitions (European Commission, 2023c). The EU support for developing and enhancing the activities and impact of CoVEs is expected to remain high, considering the target of at least 100 to be funded by 2027 as set out in the Labour and Skills Shortages Action Plan.

3.4.2. Net-Zero Industry Academies

Net-Zero Industry Academies²⁹ represent an initiative to enhance skills provision and support green transition under Article 30 of the **Net Zero Industry Act**. It consolidates access to skills and job opportunities in sectors that support the deployment, use, and development of net-zero technologies in the EU. The establishment of the academies will be funded through various financial instruments and will develop credentials and learning content for education and training providers at all levels of education and qualifications and in the entire value chain of the specific sector. They are expected to reach 100,000 learners each within three years from their set-up (European Commission, 2024i).

3.4.3. European Quality Assurance in Vocational Education and Training

The European Quality Assurance in Vocational Education and Training (EQAVET)³⁰ is a European network that gathers VET stakeholders (e.g., Member State authorities, social partners, European Commission and EU agencies, and education and training providers) and focuses on enhancing the quality assurance in VET. It supports sharing knowledge and practices that strengthen quality assurance and management at both system and provider levels. EQAVET's role was reinforced by the Recommendation on VET for Sustainable Competitiveness, Social Fairness and Resilience (2020) detailed in Section 3.2.2. EQAVET develops principles, indicators, and various resources and tools to enhance quality assurance in VET. EQAVET network is supported by National Reference Points (NRPs) that coordinate actions at national, regional and local levels, all MS have established NRPs. The NRPs implement and further develop the EQAVET framework, collaborate with local stakeholders, organise various events for peer and mutual learning, and enhance transparency and trust in VET systems. In terms of the take-up of various EQUAVET tools, an evaluation observed that 24 MS used the EQAVET quality cycle, 19 MS used the indicative descriptors, and 21 used the indicators developed (EQUAVET, 2023).

3.4.4. Europass

Europass³¹ is a free online service provided by the European Commission to assist jobseekers to find employment across the EU. It assists people to effectively communicate their skills and qualifications to potential employers. It helps individuals to reflect upon their current skills and experiences, provides tailored information on learning opportunities and job openings, CV and cover letter templates for job

²⁹ Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401735.

³⁰ Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Quality Assurance Reference Framework for Vocational Education and Training. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009H0708\(01\)&qid=1611571795661](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009H0708(01)&qid=1611571795661).

³¹ Decision (EU) 2018/646 of the European Parliament and of the Council of 18 April 2018 on a common framework for the provision of better services for skills and qualifications (Europass) and repealing Decision No 2241/2004/EC. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0646>.

applications, and various links and support networks. This EU-level tool was revamped following the launch of the European Skills Agenda in recognition of its importance for effectively connecting individuals with jobs and learning opportunities. An evaluation of Europass in 2024 revealed that it had around 4.5 million user profiles at the end of 2022 and had been visited by around 32.4 million unique visitors since its relaunch in 2020. The evaluation also flagged the need for some improvements connected with the information provided on career guidance, validation and recognition of qualifications, and the database of qualification and learning programmes, which facilitates access to real-time data on upskilling and reskilling opportunities (European Commission, 2024k).

3.5. Initiatives related to digital skills

The focus on digital skills has emerged as an important area for skills initiatives, given its importance to the future prosperity of the EU. Beblavý and Bačová (2022) observed that in many MS, the policies adopted to promote the delivery of digital skills do not provide equal and universal access. There was also said to be a lack of evidence on the impact and cost-effectiveness of policies and initiatives and limited mapping of digital skills supply.

In 2022, the European Commission entered a **Structured Dialogue** on digital education and skills with the MS to enhance and facilitate the digital transformation of education and training systems. This dialogue focused on sharing experiences and lessons learned from reforms already implemented, along with examples of good practice and the challenges faced in strengthening access and availability of digital education and skills. The results of the structured dialogue revealed that the supply of digital skills training was perceived as insufficient. Most MS identified a growing shortage of ICT specialists (European Commission, 2023d). The resulting adoption of the Council Recommendation of 23 November 2023 on the Key Enabling Factors for Successful Digital Education and Training (detailed in Section 3.2.6. above) advised stronger coordination of MS initiatives that address digital skills and education through dedicated strategic approaches and the improvement of teaching personnel's digital skills.

The **Digital Skills and Jobs Platform**³² provides open access to a wide variety of high-quality information and resources for everyone interested in the broad topic of digital skills and jobs. It facilitates access to training and skills development opportunities to boost the digital skills of all EU individuals and companies. The platform supports the Digital Europe Programme, which is focused on enhancing Europe's competitiveness in the global digital economy. Additionally, the **Digital Skills and Jobs Coalitions**³³ developed in 25 MS, play a role in fostering digital skills at national and European levels. The coalitions share information about national digital skills policies, best practices, training opportunities, events, and various resources to raise awareness of the importance of digital skills in the future. The National Coalitions gather public and private stakeholders (e.g., ministries of employment and education, public agencies, formal education and training providers, social partners, associations, non-profit and social organisations, companies, etc.) who implement practical measures to deliver digital skills. The National Coalitions are a key provider of information that is shared on the Digital Skills and Jobs Platform.

Along with the multitude of EU initiatives focused on basic digital skills, there are actions that aim to equip the workforce with **advanced digital skills** required by the digital transition. The boost in using and developing digital technologies coupled with the importance of cybersecurity in ensuring their safe deployment have increased advanced digital skills shortages. The **Cybersecurity Skills**

³² Digital Skills and Jobs Platform. available at: <https://digital-skills-jobs.europa.eu/en/about/digital-skills-and-jobs-platform>.

³³ Digital Skills and Jobs Coalition, available at: <https://digital-strategy.ec.europa.eu/en/policies/digital-skills-coalition>.

Academy³⁴ supports the supply of cybersecurity education and training and engages in actions to increase the number of cybersecurity professionals (European Commission, 2023e). The initiative focuses on developing a common EU approach for cybersecurity training, including frameworks for defining and assessing the skills through national and EU Cybersecurity Campuses and Academies; consolidating MS and EU level financial support for the provision of cybersecurity skills; strengthening the cooperation of stakeholders in reducing the labour and skills shortages; and consolidating data gathering and development of relevant indicators to monitor the progress and impact of this initiative.

The efforts to support the acquisition of both basic and advanced digital skills play an essential role in helping individuals and companies adapt and navigate the digital transition. Financial support for basic digital skills is around EUR 15.4 billion in the 2021-2027 period, and around 2.1 million people have already participated in education or training focused on digital skills in the period 2021 – 2023. In 2024, 56 per cent of the EU's population had at least basic digital skills which means a lot of ground will need to be made up to reach the 80 per cent target for 2030. Similarly, the number of ICT specialists, at 9.6 million, is below the 20 million target for 2030 (European Commission, 2024r). Much still needs to be achieved to meet the EU's Digital Decade 2030 targets.

3.6. Sources of financial support for various skills initiatives

There are manifold sources of funding that support various stakeholders, individuals, sectors, and regions in the EU MS in investing and expanding the provision of required skills. Some of the key ones are summarised below. In essence, their purpose is to finance the implementation of actions, measures, and activities under the initiatives described in the previous sections that would rely on national /regional financial resources or would not otherwise be funded.

3.6.1. Financial support for skills initiatives and actions at the EU level

Erasmus+³⁵ is an important EU financial support initiative for education, training, youth, and sports activities for the period 2021 – 2027. It plays an essential role in financing projects relevant to the priorities and activities set out in the European Skills Agenda and the Digital Education Action Plan. The programme provides learning mobility opportunities for young people and adults that increase their skill level and labour market integration. It also supports actions that expand cooperation among organisations and institutions, such as activities of the alliances for sectoral cooperation on skills and the CoVEs. An evaluation among Erasmus+ graduates revealed that they manage to enter the labour market faster after graduation and tend to be more open to international careers compared with non-mobile students (European Commission, 2019b).

The **Digital Europe Programme (DIGITAL)**³⁶ supports the provision of advanced digital skills necessary to understand, design, develop, manage, test, deploy, use and maintain the technologies, products and services in areas such as high performance and cloud computing, big data analytics, cybersecurity, distributed ledger technologies (e.g., blockchain), quantum technologies, robotics, and AI.

³⁴ Digital Skills & Jobs Platform. *Cybersecurity Skills Academy*. Available at: <https://digital-skills-jobs.europa.eu/en/cybersecurity-skills-academy>.

³⁵ Regulation (EU) 2021/817 of the European Parliament and of the Council of 20 May 2021 establishing Erasmus+: the Union Programme for education and training, youth and sport and repealing Regulation (EU) No 1288/2013. Available at: <https://eur-lex.europa.eu/eli/reg/2021/817/>.

³⁶ Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe Programme and repealing Decision (EU) 2015/2240. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021R0694>.

The **Technical Support Instrument** (TSI)³⁷ helps Member States advance their national reform agendas. It finances projects that increase the policymaking and implementation skills of public officials and reforms MS develop to enhance the effectiveness of their education, training and skills systems, including mapping the skills needed in various sectors, and improving the recognition system of skills and qualifications acquired outside the EU.

3.6.2. Financial support for skills initiatives and actions in the Member States

The **European Social Fund Plus** (ESF+)³⁸ remains the cornerstone of EU cohesion policy, serving as the main programme for investing in employment, education and skills, and social inclusion of people (European Commission, 2024m). Among its specific objectives, ESF+ funds the assessment and anticipation of skills needs; and promotes lifelong learning, in particular upskilling and reskilling opportunities. By the end of 2022, the activities financed and implemented in the Member States with support from ESF and the **Youth Employment Initiative** (that represented the financial initiative supporting the Youth Guarantee targeting young NEETs) have helped 10.3 million people gain a qualification and supported around 3 million people to participate in education and training programmes (European Commission, 2024n).

The **European Regional Development Fund** (ERDF)³⁹ supports actions to strengthen economic, social and territorial cohesion. Among ERDF's priorities is the support provided to SMEs that invest in skills for smart specialisation, industrial transition and entrepreneurship, especially for equipping people with technical, management, entrepreneurship, and green skills.

The **European Solidarity Corps**⁴⁰ supports volunteering activities in the EU for persons aged 18-30 years old. The opportunities developed through this programme enhance the acquisition of various skills, such as foreign languages, soft skills (e.g., adaptability, teamwork, emotional intelligence, etc.), and intercultural interaction skills.

The **European Globalisation Adjustment Fund for Displaced Workers** (EGF)⁴¹ co-finances measures designed to help workers made redundant (i.e., at least 200 displaced workers or self-employed persons, over a reference period of four months in an enterprise, SMEs, sector or region/s) find other employment opportunities, including participating in up-skilling and reskilling. In the period 2021-2023, around 7,500 people received support through projects financed by EGF valued at close to 49 million euros (European Commission, 2024o).

The **Recovery and Resilience Facility**⁴² (RRF) is a measure designed to assist MS emerge from recent crises more resilient. Through the Facility, the Commission raises funds by borrowing on the capital markets. These are then available to Member States to implement reforms which assist with, amongst

³⁷ The TSI is an EU Commission instrument to provide technical support to reforms in the MS. TSI is part of the Multiannual Financial Framework (MFF) 2021-2027 and of the Recovery Plan for Europe. Available at: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/technical-support-instrument/technical-support-instrument-tsi_en#about-the-tsi.

³⁸ Regulation (EU) 2021/1057 of the European Parliament and of the Council of 24 June 2021 establishing the European Social Fund Plus (ESF+) and repealing Regulation (EU) No 1296/2013. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021R1057>.

³⁹ Regulation (EU) 2021/1058 of the European Parliament and of the Council of 24 June 2021 on the European Regional Development Fund and on the Cohesion Fund. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021R1058>.

⁴⁰ Regulation (EU) 2021/888 of the European Parliament and of the Council of 20 May 2021 establishing the European Solidarity Corps Programme and repealing Regulations (EU) 2018/1475 and (EU) No 375/2014. Available at: <https://eur-lex.europa.eu/eli/reg/2021/888/>.

⁴¹ Regulation (EU) 2021/691 of the European Parliament and of the Council of 28 April 2021 on the European Globalisation Adjustment Fund for Displaced Workers (EGF) and repealing Regulation (EU) No 1309/2013. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=uriserv:OJ.L_.2021.153.01.0048.01.ENG.

⁴² Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021R0241>.

other things, managing the digital and green transitions. This includes the provision of training linked to digital and green skills (European Commission, 2024p). Since the start of this facility, more than 728,000 enterprises (majority SMEs) have received support for the use and development of advanced digital technologies such as AI, cybersecurity and blockchain (European Commission, 2024s).

3.6.3. Financial support for skills initiatives and actions to facilitate the green transition of regions and sectors

Under the **Just Transition Mechanism**, support is provided by the **Just Transition Fund**⁴³ to activities that target the upskilling and reskilling of workers and jobseekers in Member State regions facing serious socio-economic challenges in the transition process towards reaching the 2030 targets for energy and climate. Similarly, the **Modernisation Fund**⁴⁴ helps 13 MS meet the climate neutrality targets by financing projects to modernise the energy systems and improve energy efficiency. Support is available to reskill /upskill workers in regions adversely affected by actions designed to reduce carbon emissions. The **Programme for Environment and Climate Action** (LIFE)⁴⁵ supports the transition towards a sustainable, circular, energy-efficient, renewable energy-based, climate-neutral and climate-resilient EU economy. The programme finances projects implemented by the **BUILD UP Skills** initiative, which supports actions implemented by the construction sector Pact for Skills. It is looking to deliver upskilling /reskilling opportunities to at least 25 per cent of the construction workforce over the next five years to assist with the decarbonisation of buildings (Pact for Skills, 2022).

3.7. Conclusion: how various initiatives respond to emerging skill needs across the EU

3.7.1. A synopsis of recent EU initiatives

The recent past has seen the launch of numerous initiatives to ensure that the EU possesses the skills to meet the skill needs that are likely to emerge from the digital and green transitions over the medium term. As the preceding sections make clear, these are manifold and wide-ranging. Table 6 below classifies the various initiatives with respect to their primary aims.

First, there are the underlying **principles which guide skills policy making**. These are found in the Charter of Fundamental Rights of the European Union (Article 14, Right to Education) and the European Pillar of Social Rights (Principle 1, which grants a right to high-quality and inclusive education, training and life-long learning). The latest European Skills Agenda (2020) sets out the **strategic objectives and ambition of skills policy** to be developed over the short to medium term with respect to safeguarding the EU's international competitiveness in a socially fair and inclusive manner. **Action plans** – such as those on labour and skills shortages or the one attached to the EPSR – set out how various strategic ambitions are to be realised.

⁴³ Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Just Transition Fund. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1056>.

⁴⁴ Commission Implementing Regulation (EU) 2020/1001 of 9 July 2020 laying down detailed rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards the operation of the Modernisation Fund supporting investments to modernise the energy systems and to improve energy efficiency of certain Member States. Available at: https://eur-lex.europa.eu/eli/reg_impl/2020/1001/oj.

⁴⁵ Regulation (EU) 2021/1056 of the European Parliament and of the Council of 29 April 2021 establishing a Programme for the Environment and Climate Action (LIFE), and repealing Regulation (EU) No 1293/2013. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0783>.

Table 6: Classification of EU skill initiatives

Type of Activity	Initiative
Underlying Principles, Strategic and tactical responses	Charter of Fundamental Rights of the European Union European Pillar of Social Rights EPSR Action Plan European Skills Agenda Recommendation on Vocational Education and Training (VET) for Sustainable Competitiveness, Social Fairness and Resilience Digital Education Action Plan Recommendation on Improving the Provision of Digital Skills and Competences in Education and Training Recommendation on the Key Enabling Factors for Successful Digital Education and Training Action Plan on Labour and Skill Shortages
Increasing the volume of skills supply	European Skills Agenda Recommendation on Individual Learning Accounts Recommendations on a European approach to Micro-credentials for Lifelong Learning and Employability Recommendation on Improving the Provision of Digital Skills and Competences in Education and Training Recommendation on Reinforcing the Youth Guarantee Communication on attracting non-EU countries' talents
Improving the quality of skills supply	EQAVET Recommendation on Vocational Education and Training (VET) for Sustainable Competitiveness, Social Fairness and Resilience CoVES Net Zero Academies Cybersecurity Skills Academy
Information provision	European Skills Agenda EQAVET Europass Digital Skills Platform
Co-operation and social partnership	Pact for Skills Blueprint Alliances EAfA European Year of Skills
Access to funding	Various sources that support skills initiatives at the EU level (e.g., Erasmus+) and in the Member States (e.g., ESF+)

Source: Authors' own elaboration.

The principles, strategic ambitions and action plans provide, in a sense, the social contract and guidelines for skills policy making. A recurring theme in the policy making process is the objective of **increasing the supply of skills** in a way that is matched to labour demand. Measures here include those which are designed to increase the agency of individuals in the labour market to acquire skills. This is seen most clearly in, respectively, the Individual Learning Account and the Reinforced Youth Guarantee Recommendations, which focus on strengthening individuals' access to skills training. There are also actions designed to reduce barriers to accessing accredited training. The Recommendation on Microcredentials, for instance, potentially provides both individual workers and employers with access to short duration accredited training, which has the potential to accumulate over time into a full qualification at a given EQF level. Increasing the supply of training also addresses how highly skilled third-country nationals might be persuaded to work in the EU.

The supply of skills needs to be of high quality. **Improving the quality of skills provision** is mentioned in relation to nearly all skills policy making. Various initiatives refer to the need for skills provision to confer accredited skills that have economic value in the labour market and prepare people for the future. These skills are delivered in an effective and efficient manner and provide the basis for progression. As noted in relation to micro-credentials, there is also an increasing emphasis on the provision of training that is flexible and responsive to the needs of learners and employers. EQAVET provides a forum in which information on relatively good practices can be shared across the EU. There are also more specific measures that advocate the establishment of specialised learning institutions, such as CoVES, which forge coalitions of expert training providers in specific fields that, in combination, have the potential to deliver something more than the sum of their parts.

3.7.2. Take-up and adoption

The foregoing has provided information on numerous initiatives launched by the EU to increase skills supply matched to emerging demands. The evidence suggests that there have been substantial levels of participation in the initiatives as indicated in Table 7. Ideally, a measure of additionality is desirable to indicate the net impact of the various initiatives across the EU (i.e., what would have happened in its absence), but in many respects this is not feasible. Many measures are introduced at the MS level in a way that is best suited to their needs rather than a top-down initiative that is implemented or adopted in the same way in each MS. It is apparent that efforts are made to ensure that the social partners are involved in various skill initiatives, such as the Pact for Skills or the European Alliance for Apprenticeships, to ensure that a wide range of views are represented in their management and implementation. SMEs are sometimes particular point of focus given that they sometimes struggle to engage in training /skills development (see Section 2.6). For instance, identifying the means to allow SMEs to take on apprentices has been a focus of the European Alliance for Apprenticeships (European Commission, 2022a). SMEs are signatories to the Pact for Skills and represent a focus for some of the regional partnerships, and partners in various Blueprint Alliances (European Commission, 2024t).

Table 7: Take-up and adoption of key EU skill initiatives

Initiative	Participation, progress and adoption
Regulatory Interventions	
Recommendation Reinforcing the Youth Guarantee	3.9 million participants by end of 2022 the majority of which were unemployed young people (82 per cent), below the age of 25 years (72 per cent), and with a low or medium level of education (75 per cent).
Recommendation on Vocational Education and Training (VET) for Sustainable Competitiveness, Social Fairness and Resilience	In 2023, 81% of VET graduates aged 20-34 were in employment 1-3 years after graduation (Target 82%) / in the same year, 63% of recent graduates from VET benefited from exposure to work-based learning during VET (Target 60%).
Council Recommendation on ILAs	15 MS have used EU financial resources to develop ILAs.
Council Recommendation on Micro-credentials	Most MS already had in place measures providing access to short duration education and training activities similar to micro-credentials.
Co-operation and awareness raising initiatives	
Pact for Skills	2,500 signatories have facilitated the development of over 34,000 training programmes and the participation in upskilling and reskilling of 3.5 million people.
Blueprint Alliances	In the period 2018 – 2021, 21 Blueprint Alliances were developed. In the period 2022 – 2023, 19 projects supporting sectoral Alliances were selected for funding. These are sectors which account for a substantial share of EU employment.
European Alliance for Apprenticeships	Between 2013 and 2024, over 3,000 pledges were registered from stakeholder organisations which covered around 2.7 million apprenticeship places.
European Year of Skills	More than 2,000 events organised across the EU to raise awareness about skill developments.
Delivery of Skills	
EQAVET	24 MS use the EQAVET quality cycle, 19 MS use the indicative EQAVET descriptors, and 21 use EQAVET indicators.
Europass	Around 4.5 million user profiles at the end of 2022. Since its launch in 2020 there have been around 32.4 million unique visitors.
Digital Skills Initiatives	
Digital Skills Coalitions	Developed in 25 MS.
Support to improve digital skill provisions	Financial support for basic digital skills has assisted around 2.1 million people to participate in digital skills education and training in the period 2021 – 2023.

Source: Authors' own elaboration.

3.7.3. Policy gaps

In many respects, initiatives at the EU level are comprehensive and often innovative, as the preceding sections have demonstrated. Over time, the EU has developed a substantial infrastructure which is able to provide advice and guidance on a range of skill issues. EU skills policy making is difficult, not least because the configurations of skill systems vary across the EU, as do their specific support needs. The requirements of one MS will be different to those of another. Policy making, in many respects, is dependent upon non-binding measures applicable in any MS and which abides by the principle of subsidiarity. Notwithstanding the complicated space within which EU policy making needs to operate, the EU has been able to develop a wide range of initiatives which build on relatively good practices across the Member States.

Bearing in mind the above caveat, initiatives designed to improve future skills development might warrant further attention focused on the following:

- demand-side factors;
- skill mismatches;
- being clear about greening;
- non-standard employment /platform work.

Nearly all the initiatives described above are supply-side ones. There has been a concentration of effort to devise measures which will increase the volume and quality of skills supply. Much less attention, it would appear, has been focussed on **how to increase the demand for skills**. This critique might be considered a little unfair insofar as this might be seen as the remit of industrial policies rather than those concerned solely with skills. But if the aim is to ratchet up both the demand for, and supply of skills – which seems, at the very least, to be implicit in the European Skills Agenda – then there is a need to consider how employers might be persuaded to increase their demand for, and investments in, skills. Arguably, there needs to be a demand side complement to the policy making on skills supply. This will be beneficial to **achieving the goal of high skills equilibrium** across the EU, where increases in the demand for, and supply of, skills are mutually reinforcing.

There is frequent mention of skill mismatches in the skills discourse, especially skill shortages. While there are various skill mismatch measures and statistics – many of which have been developed by Cedefop – arguably **more needs to be known about the scale and impact of skills shortages** and their underlying causes. Although measures are available about the extent to which workers are under- or over-skilled to undertake their current jobs – a more holistic understanding is required. Arguably, without a fuller understanding of the extent, causes, and implications of skills shortages across the whole EU, it will be difficult to devise effective policy responses. Without more emphasis on the causes of skills shortages, measures to increase skills supply may fall short of their ambition.

When looking to the future, frequent mention is made of the twin digital and green transitions and the demands these will make of workers' skills in the future. In the case of the digital transition, there is a well-established understanding of how technological change linked to ICT and new digital technologies will affect the demand for skills in the future. In contrast, **the concept of the green transition and its impact on skills is difficult to isolate**. Ideally, policy making needs to be clearer about what green means. Without more detail about the various elements that comprise the green transition, it is difficult to determine the skill needs that are likely to arise. There are some general statements which tend to identify generic skills which every kind of change requires, or detailed studies from which it is difficult to generalise.

Finally, future employment may be characterised by increased use of non-standard working. Platform work is, at present, undertaken in the EU on a relatively small scale, and, in many instances, those engaged in the activity have other jobs. This could change in the future with an increase in the number of people who are ostensibly self-employed. **How to provide reskilling and upskilling to people who are self-employed with the means to update their skills** may well be worth further consideration. There are already developments here with the adoption of the Platform Work Directive, but it is unclear how it will address the skill needs of self-employed platform workers.

4. CONCLUSION AND RECOMMENDATIONS

4.1. The challenge facing the EU

The EU is experiencing a period of transition. New digital technologies, the shift to more sustainable, environmentally friendly patterns of production and consumption, and a shrinking workforce all have implications for skill demand. AI, for instance, has the potential to enhance the skills of existing jobs and create new ones. Similarly, the shift to more sustainable models of production promises to create new activities linked to, for example, recycling, reusing, and repurposing products, which, in turn, will create new skill demands. To date, the outcomes from the digital and green transitions appear to have been broadly positive. There is little sign of digital technologies resulting in wholesale job destruction, or the green transition leading to substantial job loss in sectors with relatively large carbon footprints.

It would be complacent to anticipate that the broadly benign effects of the twin digital and green transitions will continue. There are clearly risks ahead. AI may yet pose significant employment and skill challenges, especially if skill substitution rather than skill enhancement becomes the dominant form of change. Unwelcome economic outcomes may yet arise if, for instance, climate change were to bring about increased desertification along the Mediterranean and reduce the viability of some economic activities in the region. This could have major implications for labour and skill demand.

It also needs to be noted that accompanying the green and digital transitions is the demographic one. The EU labour force is shrinking and ageing. This has placed increased demands on health and care systems, which need to recruit more skilled personnel from labour markets with fewer workers for hire. New technologies may provide part of the solution but are unlikely to do so quickly enough to avert persistent labour and skill shortages over the medium-term.

Uncertainty is a key theme running through commentaries about the impact of the digital, green and demographic transitions on the future demand for skills. As will be explained below, the EU has developed a panoply of measures to serve whatever eventualities for skills demand emerge from the digital, green and demographic transitions over the medium-term. There are, it should be highlighted, strategic choices for the EU, Member States, employers and individuals to make with respect to the digital, green, and demographic transitions. There is, for example, no evidence of technological determinism dictating that a given technology necessitates a specific form of work organisation and configuration of skills use. A single technology may result in very different skill needs depending upon the choices made by those charged with its introduction.

4.2. The EU's response

4.2.1. Current policy focus of the EU Skills Initiatives

In raising to the medium-term challenges which face the demand for skills, the EU has developed a range of initiatives designed to:

- establish a set of underlying principles designed to guide skills development (in essence, providing rights about access to continuing training and lifelong learning);
- increase the volume of skills supply;
- improve the quality of skills supply;
- improve information provision to guide future investments in skills by a range of actors;

- develop a co-operative approach, building on social partnership, to improve the quantity and quality of skills delivery;
- fund various skill initiatives in Member States.

In summary, EU skills policy is designed to provide a range of information to guide investments in skills development. The EU has made substantial investments to improve the delivery of labour market skills intelligence to help steer skill investments in the direction of where demand is greatest, and the returns are highest. Identifying skills demand needs is complemented by measures to support the skills supply. These are required to surmount the barriers which sometimes prevent skills development from taking place and ensure that delivery is of a high quality. Developing appropriate measures relies in large part upon cooperation, at EU and MS levels, between a wide range of social partners to identify practices which are seen to work best in differing national, regional or sectoral contexts. In this way, the EU can take advantage of the wide range of experiences across the Member States. Finally, EU funding provides the required support to various initiatives that might not otherwise be forthcoming.

Over time, skill levels have increased in the EU. Measured with reference to either occupation or qualification, the evidence points to an increased share of the employment accounted for by people working in relatively highly skilled occupations (e.g., managers, professionals, and associate professionals) with relatively high levels of qualification (i.e., qualifications typically obtained by completing tertiary education). Cedefop's skill forecasts suggest that the share of employment accounted for by people working in relatively high skilled jobs and with relatively high-level qualifications will continue to increase over the medium-term. Considerable efforts have been undertaken to improve skills anticipation. In addition to Cedefop's skills forecasting substantial efforts have been expended on facilitating improvements in the supply of labour market skills intelligence. This has increasingly extended into identifying the specific types of skills individuals will need to acquire with a particular focus on the role VET can have in delivering them.

It is difficult to assess the impact of individual measures introduced at the EU level. Over time, the evidence points to improvements in the performance of MS VET systems (Cedefop, 2018). At the same time, the evidence points to numerous challenges which prove to be persistent. This includes:

1. the substantial share of employment in relatively low skilled jobs (elementary jobs). This is expected to remain fairly static over the medium-term;
2. the share of the EU population participating in training over the last 12 months, which has been increasing but remains substantially below the target set in the European Skills Agenda;
3. unequal access to training by both age and gender;
4. occupational segregation by gender (this is especially evident in relation to the low share of IT specialists who are women);
5. persistent skill mismatches. A substantial share of the workforce is over-qualified, given the tasks required in their current jobs, but there are also reports of skill shortages.

These are all recognised by policy makers in the EU. As shown in Table 8, there have been policy responses in relation to each of the key skill challenges facing the EU.

Table 8: Skills policy challenges facing the EU

Challenge	Measures	Wider issues relating to priority
A substantial share of people employed in relatively low skilled jobs (elementary jobs)	Various measures designed to upskill individuals are in place (e.g., Upskilling Pathways)	As well as assisting employees to upskill, there is a need for employers to increase their demands. To some extent, this lies outside of the domain of skills policy (i.e., how to persuade employers to move up in the market and require higher-skilled profiles).
The share of the population in training is below target	There are various measures which are either directly or indirectly targeted at individuals	So long as training is dependent upon employer provision, there are a range of economic barriers to address which effectively dissuade employers from training (e.g., concerns about free riders appropriating the skills).
Unequal access to training	The principle of equality of opportunity is evident throughout EU policies	In relation to age, this is likely to reflect the reluctance of employers and employees to engage in the training, especially for older workers. In relation to gender, it is likely to be related to occupational segregation.
Occupational segregation by gender	The need to increase women's participation in STEM is a key part of policy initiatives	The root cause of this is the subject choices made in school, given the long lead times to produce high level STEM skills.
Persistent skill mismatches	Initiatives designed to improve skills intelligence and skills anticipation are designed to address this aspect	To some extent, a degree of over-qualification or over-skilling may be desirable insofar as it provides skills which will have future value. Many policies have to do with upskilling, moving from one level to the next when the problem may have as much to do with horizontal mismatches as with vertical ones.

Source: Authors' own elaboration.

4.2.2. The future focus of the EU Skills Initiatives

Some indications about the future EU skills initiatives foreseen by the European Commission can be found in the Mission Letter⁴⁶ from President Ursula von der Leyen to the designated Executive Vice-President for People, Skills and Preparedness, Roxana Minzatu. To continue the efforts in tackling skills and labour gaps that hamper the EU's competitiveness, the focus is on the following:

- presenting a **new Action Plan** for the implementation of the **European Pillar of Social Rights** in 2025;
- developing a **Quality Jobs Roadmap** with the social partners that will support, among others, the acquisition of skills through training;
- designing an EU strategy that delivers a **Union of Skills** focused on investments, lifelong

⁴⁶ Roxana Minzatu Mission Letter, available at: https://commission.europa.eu/document/27ac73de-6b5c-430d-8504-a76b634d5f2d_en.

learning, VET, skills retention and recognition and strengthening the skills intelligence system;

- preparing a **Skills Portability Initiative** that **enhances skills and qualifications recognition** and supports individuals' efforts to upskill, reskill and career progressions;
- developing a **European Strategy for Vocational Education and Training**;
- developing an **Action Plan on Basic Skills** and a **STEM Education Strategic Plan** to enhance the efforts in these areas and for digital skills.

Additionally, some of the initiatives described in this study, such as **the Pact for Skills, skills academies** and the **EU Talen Pool**, will be continued and strengthened by future actions proposed at the EU level.

4.3. Recommendations

The recommendations provided below are based on addressing the gaps identified in the analysis of skills policy and the current challenges that remain despite innovations in the development of skills policy.

A focus on the demand side. Policy making tends to concentrate almost wholly on the supply-side. Considerable emphasis is given to increasing the volume of supply and the quality of the systems in place to deliver skills. If this works effectively, then it will, over time, satisfy current and projected demand. But what if current demand is too low? The European Skills Agenda is framed, in part, with regard to the role skills development can play in improving EU competitiveness and productivity. There is room for measures which address how employer demand for skills might be increased. This might take the form of increased flows of information, delivered through social partnerships and cooperation, to inform employers of the benefits of investing in skills for the future prosperity of their businesses. Alternatively, it might take the form of directly engaging with employers to help them identify the skills they need – and how they might be obtained – to satisfy their product market strategies or ratchet up these strategies. A focus on the demand side is about identifying how the demand for skills can be stimulated to shift the EU economy towards a higher skills equilibrium.

If there is to be a focus on raising the demand for skills to achieve a higher skill equilibrium in the future, this will necessitate attention on, amongst other things, stimulating demand from employers. SMEs comprise the largest share of employers in the EU but sometimes face unique barriers to investing in skills. This will need to be addressed if their skill demands increase. And if skill demands are to be increased against a background of a shrinking labour force, then more attention will need to be given to conferring skills an increased economic value on those parts of the workforce which to date have faced barriers of one kind or another to obtaining the skills allowing them to progress in the labour market. This refers to those who remain trapped in relatively low skill, low wage employment, and those who are deterred from pursuing careers which are associated with relatively high returns, such as those in STEM. If skill demand is to increase, then the importance attached to measures which allow the EU to make the most of all the talent available becomes much more significant.

Tackling skill mismatches. Shifting the EU economy towards a higher skills equilibrium may well have a beneficial impact on the degree of skills mismatch in the EU, especially the degree of over-skilling. Over the longer-term, improvements on the supply-side, which make it more responsive to satisfying current and future skills supply, may well reduce the degree of skills mismatch. But this does little to assist those who are currently mismatched in their current jobs. There would appear to be space for short-term measures which assist those who are either over- or under-skilled in their current job. To some extent, the Labour and Skill Shortages Action Plan addresses this issue, but there may need to be

more emphasis on addressing the issue given its scale across the EU. The degree of skills mismatch indicates that there are, in aggregate, substantial opportunity costs resulting from skill mismatches.

Improving labour market skills intelligence about skill mismatches. Information about skill mismatches of individual workers is relatively well developed in the EU. The European Skills and Jobs Survey, a survey of workers, is particularly relevant in this context. Information from the employer side is less well developed with respect to skill shortages where it proves difficult to disentangle whether employers experience difficulties recruiting and retaining people with the skills they need because these people are in short-supply from the external labour market, or because the terms and conditions of employment are below the going rate. Moreover, EU-wide information on the barriers which prevent employers from investing in the skills of their existing workers is required. Ideally, a more holistic conceptualisation of skill mismatches, their measurement, and their impacts is needed. A list of skills shortage jobs for the EU and each MS, using a common methodology, may be a small-scale but useful development.

Being clear about green skills and green jobs. The green transition and the demand for green skills are sometimes something of a black box. It is often taken for granted that there is an understanding of what is involved. There may well be merit in decomposing what the green transition is likely to mean in practice and being clear about the types of skills and needs that are likely to arise from different elements of the green transition. Currently, the evidence base is scattered across myriad sources.

Improving access to high-skilled jobs and training, especially for those in non-standard forms of employment. There is recognition that access to some jobs, especially highly skilled STEM related ones, is unequal. There is a gender divide which would appear to be rooted in subject options students select in school. There are also problems attached to accessing training, especially for those in precarious employment. There is the danger that future change will exacerbate this situation if the standard employment relationships begin to fray because of the increased take-up of, for example, self-employment linked to platform working. The signs are that this kind of working arrangement is on a small-scale for the time being, but this could readily change in the future. It may be timely to consider how existing policy responses to tackle unequal access to skills development might be future-proofed.

Skills framework simplification. In undertaking this review, large swathes of policy making have been commented upon. This reflects the complex nature of the issue being addressed and the need for multi-faceted interventions that can be implemented across MS, which exhibit stark differences in their demand for skills and the institutional arrangements available to deliver them. Nevertheless, there may be scope to think about how to streamline EU level skills policy making or, perhaps more feasibly, present it in a way that makes it easier to understand it in its entirety. This is by no means an easy task but perhaps one which merits attention by policy makers at the EU level in order to influence as wide a range of actors as possible.

4.4. A final comment

EU skills policy has matured over many years. Labour market skills intelligence and skills anticipation have improved over time, with an increasing volume of data now available to identify current and emerging skill needs and to guide investments in skills. There are now many measures in place to, amongst other things, assist people in finding a job which matches their skills and interests, deliver accredited training, and provide assurance that skill delivery satisfies various quality requirements. These provide a strong base for the EU to respond to the challenges posed by the digital, green and demographic transitions. Depending upon how these transitions pan out over the medium-term, may well increase the demands made on education and training systems. The suggestions provided above are designed to bring about marginal improvements to ensure that skills supply meets demand better.

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This study provides details of the current situation and future trends in the EU concerning aspects related to skills demands, skills shortages, and skills mismatches. It takes into consideration the transformative role of the digital and green transitions and the labour market shifts determined by demographic changes. The analysis comprises a presentation of the various EU skills initiatives, assessing their impact, complementarity and gaps. And formulates a set of recommendations to address gaps identified in the EU skills policy.

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