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# Beyond skills development: unleashing human potential

## First findings from Cedefop's European Training and Learning Survey

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The **European Centre for the Development of Vocational Training** (Cedefop) is the European Union's reference centre for vocational education and training, skills and qualifications. We provide information, research, analyses and evidence on vocational education and training, skills and qualifications for policy-making in the EU Member States.
Cedefop was originally established in 1975 by Council Regulation (EEC) No 337/75. This decision was repealed in 2019 by Regulation (EU) 2019/128 establishing Cedefop as a European Union Agency with a renewed mandate.

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# Foreword

The EU's Union of Skills strategy puts skills at the centre of the twin transitions. The aims of digitalising and greening the EU economy guide the simultaneous creation and deployment of the required skills. Technological innovation – when designed and deployed with employee empowerment – can amplify workers' capabilities, increase job quality and unlock new sources of productivity grounded in uniquely human skills: judgement, creativity, adaptability and social intelligence. Social partners play an important role in coordinating the deployment of new technology, the learning that necessarily accompanies it and the activation of workers' skills. Workers contribute to such coordination through participation and involvement in social dialogue.

This report contributes towards better understanding human-centricity in the workplace, using new evidence from Cedefop's first European Training and Learning Survey (ETLS). It builds on the work jointly done by Cedefop and Eurofound based on the 2019 European Company Survey, which identified organisations as enablers and beneficiaries of the skills deployment of their workers.

Evidence on Industry 5.0 – a strategy placing skills and human-centricity at the core of societal change – is emerging. Policymakers striving to realise its promise can find inspiration in project-based academic and applied work. These projects focus on workforce skills and lifelong learning and highlight the importance of organisational learning, continuous upskilling and workplace design as drivers of autonomy and meaningful work.

The ETLS is a representative survey deployed from 2023 to 2024 in all EU Member States and Norway and Iceland that zooms in on training, learning and expertise development in and at work. The ETLS distinguishes between participation in professional training organised and provided by employers and personal learning activities. Designed in-house by Cedefop, the ETLS is the first pan-European survey that systematically maps how people gain knowledge and build skills in the context of work.

This report uses the ETLS to uncover the relationship between workplace settings, individual characteristics and learning in the workplace. The integrated approach to work and learning that this report presents and analyses helps policymakers nurture economic systems that are more productive, fair and resilient and deliver economic prosperity and social well-being. This is key to delivering on the central ambition of the Union of Skills: empowering people with the skills they need to succeed in their educational and professional lives. We hope the analyses in this publication contribute to the evidence base underlying policy interventions that place employees at the heart of Europe's industrial, economic and social future.

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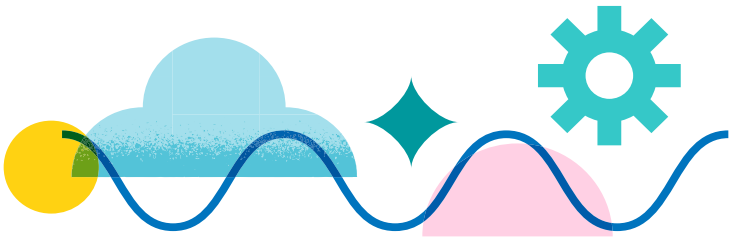

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## Leveraging Industry 5.0 in the EU skills policy landscape

In the European Union, skills and skills matching have risen to the top of the policy agenda in the past decade. The 2016 European Skills Agenda, the 2020 European Skills Agenda and flagship initiatives such as the Pact for skills foster public–private partnerships and knowledge sharing and contributed to making progress towards meeting targets set for skills, employment and inclusion. Access to funding for skills development has greatly expanded. Skills have increasingly become recognised as enablers of development, innovation and competitiveness and as drivers of the twin digital and green transitions.

The 2023–2024 European Year of Skills and the Union of Skills strategy that followed in 2025 reinforced the EU's long-standing commitment to making skills a driver of competitiveness, resilience and social fairness. Skills are one of the pillars on which the 'Competitiveness Compass' – the EU plan to reignite Europe's economy – rests.

In implementing the skills policy agenda, Europe stands to benefit from following and mainstreaming the Industry 5.0 vision. Industry 5.0 calls for a human-centric approach and recognises that lasting competitive advantage depends on skilled people and business models that place human capital at their core. Industry 5.0 marks a shift away from Industry 4.0's technology-driven paradigm, which was based on a vision of the integration of production and user experience founded on the deployment of technology such as big data and the internet of things. In the human-centric Industry 5.0 paradigm, technology does not replace workers but expands their capabilities. Industry 5.0 also implicitly acknowledges that the impact of new technology on workers is not a deterministic one but rather a policy issue: steps can be undertaken to encourage the development and deployment of technologies that could work alongside workers and enhance their capabilities.

When technologies empower workers, the organisations that employ them benefit from workers' ability to deal with more complex workplace problems. For this to happen, the empowering technology must be accompanied with improved judgement capacities on the part of workers. The quality of workers' decision-making depends on their ability to understand the context, the trade-offs characterising the situation and the interests of all parties affected – in other words, practical wisdom. As it is a driver of practical wisdom, work-related learning is central to ensuring that human-centric technological innovation delivers full value for workers, firms and society as a whole.

## Cedefop's European Training and Learning Survey

The European Training and Learning Survey (ETLS) examined employed workers (between 16 and 64 years of age, in salaried employment) about their engagement with learning at work. Fieldwork for the ETLS took place between October 2023 and February 2024 in all 27 EU Member States and Iceland and Norway. The ETLS is a cross-section based on a representative sample derived from online probabilistic samples (where available) or probabilistic telephone interviews. To augment sample sizes and boost the efficiency of estimates, the probabilistic sample was topped up with observations from commercial non-probabilistic panels.

The novelty of the ETLS is that it assesses the development of various aspects of workers' ability to do their jobs that approximate the development of expertise and practical wisdom, as perceived by workers. Studies of the development of expertise have been concentrated on a few selected categories of people dealing with structured environments (e.g. chess masters). The ETLS broadens the scope of expertise development to employees in their workplaces, which tend to be much more unstructured environments. The survey uses a scale to chart employees' gradual development of expertise. As it is

difficult to obtain objective measures of the development of expertise in unstructured environments, the scale is based on workers' self-reported improvements in selected aspects of their jobs in the past year.

The ETLS also measures worker participation in learning activities. The survey assesses the frequency of participation in 10 different learning activities relevant to professional development, after screening out participation in compulsory heath and safety, induction (for workers who recently joined the firm) and workplace behaviour training. The ETLS distinguishes between participation in professional training activities organised and provided by employers (employer-supported learning activities) and other learning activities that are employee-initiated (personal learning) in the past year. The distinction between employer-supported learning activities and personal learning activities is not always clear. Employers may organise training sessions following a request from employees, while employees may also engage in personal learning following a suggestion from a manager or supervisor.

In the short-term (one-year) perspective the ETLS considers, learning activities may not be related to skills development, and it is difficult to predict when participation in a specific learning activity will trigger change in expertise.

As the ETLS is a cross-sectional survey, the usual limitations apply. The results are best characterised as associations (correlations) rather than causal effects. While the estimated coefficients may be biased to some extent, the linear specification for the empirical model explored in this report makes it possible to assess the stability of the results. Participation in learning activities can be characterised by an intensive margin (the duration of the engagement with the activity), by an extensive margin (the frequency of the engagement with the learning activity) and by a quality margin (the perceived quality of the learning experience). To keep the survey manageable, the intensity and the quality margins could not be covered. The fact that the survey collected information on the extensive margin of participation in learning activities, through the frequency of engagement in the various learning activities, is another limitation of the ETLS.

## Empirical analysis and results

The approach taken in this report is that the interaction between personal and contextual variables determines one's disposition towards learning for work. This choice is reflected in the theoretical model used for the data analysis: the ability, motivation and opportunity (AMO) model. 'Ability' reflects the individual's ability to successfully learn, 'opportunity' captures the effect of the context and 'motivation' reflects the interplay between the context and the environment.

The analysis of the ETLS data supports the idea that skills development is affected by worker and workplace characteristics. The following results illustrate the relationship between the AMO model components and the degree of skills development.

(a) **Ability.** Workers with clear learning goals and confidence in achieving them report higher skills development.

(b) **Motivation.** This area is strongly linked to skills growth, but shaped jointly by personal drivers (interests, values) and workplace incentives (promotion prospects, recognition).

(c) **Opportunity.** Job autonomy and managerial support foster skills development; competitive peer comparison environments hinder it by shifting focus to task execution and undermining trust.

The learning effort and the ability to learn from multiple activities and the capacity to manage workload also increase skills development. Skills development is also higher among under-skilled workers and those experiencing job redesign. Viewing learning as a key to career progression and clear learning goals tend to be positively associated with more expertise development.

Participation in learning activities lead to growing expertise. This result can be considered as a conservative estimate since it does not take into account that it takes time to develop expertise. The ETLS asks about the frequency of participation in learning activities and about the degree of skills development over the past 12 months. In this time span, skills development and participation in learning activities can be considered contemporaneous. It cannot account for the effect that current knowledge

on the development of future knowledge and skills. Knowledge takes time to translate into expertise, and growth is non-linear – sudden gains may occur unpredictably.

Employers tend to provide training when introducing new technologies or methods or redesigning tasks, effectively retaining control over skills development. They provide the means to help worker developing the skills that are directly linked to the use of new technology. Managerial support, promotion-linked learning and job changes are all associated with higher participation in employer-led training.

Self-initiated learning reflects personal and contextual factors. A lack of information on training or a lack of relevant training opportunities foster participation. Where employer training is scarce or not well suited, workers often turn to personal learning to fill the gaps.

## Policy implications

The ETLS analysis points towards several policy directions that decision-makers can leverage to strengthen work-related learning, skills development and worker empowerment. The findings are relevant for any policy aimed at the better use of human capital and are particularly relevant for the Industry 5.0 framework.

**Fostering a learning culture**

Skills development is difficult to observe, and managers may struggle to assess workers' participation in voluntary learning. The immediate and significant connection between participation in learning activities and skills development does not capture the effect of current knowledge on future skills development. This implies that managers will tend to underestimate the impact of their investment in human capital on the development of expertise. Such difficulties may also diminish the impact of policy messages conveying the positive returns of training provision in the eyes of managers. The results suggest that a focus on learning cultures in organisations, which assume a positive link between learning and multiple aspects of performance, may be comparatively more effective than approaches requiring precise training cost–benefit calculations. They show that signals of the presence of such a culture (e.g. support for learning and the perception that learning is vital for career progression) are linked to stronger skills development and higher participation in employer-supported and personal learning. Inspiration can be taken from policies such as the Netherlands' stimulating learning culture in small and medium-sized enterprises (SLIM) subsidy, which supports the creation of learning cultures in organisations and encourages continuous upskilling and more relational employment relationships based on long-term mutual commitment.

**Motivation as a shared responsibility**

Motivation strongly influences skills development. It is shaped by individual traits and workplace conditions. Intrinsic motivation is personal, but extrinsic factors such as pay, workplace norms and incentives also matter. A lack of motivation to engage in work-related learning among workers should not be seen solely as a personal shortcoming. As motivation reflects the interaction between personal and contextual factors, policies addressing it should therefore address the contextual and organisational conditions that support workers' motivations.

**Hidden complexity of training subsidies**

Voluntary learning often compensates when employer-supported training is lacking. Policymakers should consider the interrelatedness of personal and employer-supported learning activities. It is possible that subsidies for employer-supported training could crowd out personal learning and vice versa. The extent to which personal learning offsets the absence of employer-supported training remains unclear, but the two are not independent.

Subsidies to firms providing training can be another policy challenge. Employers tend to provide training when workers are under-skilled or job tasks change, especially when such instances are related

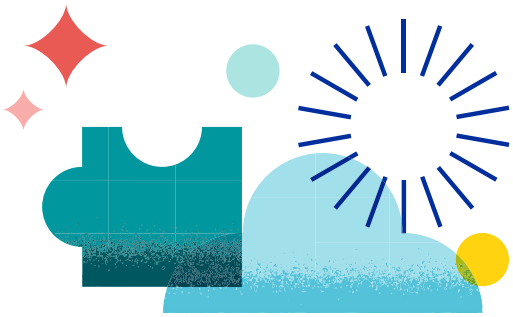
to the introduction of new technologies or working methods. In such cases, employers retain control over the supply of skills. If subsidies are given to firms that would have trained regardless, deadweight losses occur. Targeting training subsidies for situations where training would not otherwise be offered could increase the impact of policies supporting learning, and more so when they are combined with the introduction of a learning culture.

On the positive side, a clear advantage of subsidies for training is that they reduce the need to engage in precise returns on investment calculations. They encourage training provision even in uncertain contexts.

**Industry 5.0 as a catalyst for change**

The human-centric aspect of Industry 5.0 presents an opportunity to place people centre stage in employment relationships in the EU. Embedding human-centricity in the workplace means empowering workers through the adoption of organisational practices and by redirecting technology towards them.

Empowered workers can shoulder greater responsibility for decision-making. The quality of decision-making is influenced by workers' skills and workers' ability to deploy these skills in a way that is beneficial for all stakeholders. The ETLS results show that the development of practical wisdom (as measured by skills development) can be supported in workplaces.



CHAPTER 1.

# Linking Industry 5.0 to skills and learning

## 1.1. Skills as top priority in EU policy

In the European Union, skills and skills matching have risen to the top of the policy agenda in the past decade. The 2016 European Skills Agenda, the 2020 European Skills Agenda and flagship initiatives such as the Pact for skills foster public–private partnerships and knowledge sharing and contributed to making progress towards meeting targets set for skills, employment and inclusion. Access to funding for skills development has greatly expanded. Skills have increasingly become recognised as enablers of development, innovation and competitiveness and as drivers of the twin digital and green transitions.

In the 2023–2024 European Year of Skills, the EU repeatedly underlined the importance of skills for European companies' success. The European Year of Skills aimed to pursue four main objectives: promoting investment in training and upskilling; ensuring that skills match the needs of employers; matching people's aspirations and skill sets with job opportunities; and attracting skilled people from outside the EU. The European Year of Skills stood on the shoulders of the 2020 European Skills Agenda. The skills agenda is a five-year plan to strengthen competitiveness, ensure social fairness and build resilience to crises by helping individuals and businesses develop more and better skills, based on the lessons learned during the COVID-19 pandemic.

Building on the legacy of the European Year of Skills, and following the publication of the influential Draghi report, the Union of Skills communication reaffirms the importance of skills for sustained competitiveness.

## 1.2. Skills as competitive advantage – Industry 5.0

Approximately 50 % of the productivity in the EU can be traced back to human capital (European Commission. Directorate-General for Research and Innovation, 2022). Industry 5.0 – the next phase of industrialisation – implicitly acknowledges that the impact of new technology on workers is not a deterministic one but rather a policy issue (Autor et al., 2022), and that there are steps that can be undertaken to encourage the development and the deployment of technologies that could work alongside workers and enhance their capabilities (Acemoglu, 2021, Acemoglu & Lensman, 2024, Autor et al., 2022, Korinek, 2019, Korinek & Stiglitz, 2019, Rodrik, 2022).

Industry 5.0 has technological, social and environmental dimensions and has three pillars: human-centricity, sustainability and resilience. Alongside its human-centric approach, it is also socio-centric, as it recognises that the needs of individuals should complement those of society. Industry 5.0 means that employers consider the interests of a broad set of stakeholders when implementing technology, beyond those implied by shareholder value theory alone (Oeij et al., 2024). As learning for work supports a human-centric deployment of technology, it is a key aspect of Industry 5.0.

Industry 5.0 entails a transformative vision for Europe that advocates for technology to be used in a way that expands workers' capabilities. It is a paradigm shift from Industry 4.0, which was based on a vision of the integration of production and user experience founded on the deployment of technology (e.g. big data, the internet of things).

While the importance of human capital increases in the Industry 5.0 paradigm, EU companies – in particular small and medium-sized enterprises (SMEs) – appear to be not very well equipped to unlock their workers' skills. While almost all EU SMEs recognise the importance of skills for their business

models, approximately 75 % of them find it difficult to obtain the skills they need (European Commission: Directorate-General for Employment, Social Affairs and Inclusion, 2023). SMEs that experience difficulties sourcing skills report negative impacts on workload, sales and productivity. As many as 60 % of SMEs experiencing difficulties with skills report that these issues are holding back their companies (European Commission. Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, 2023).

Approximately 43 % of SMEs plan to make better use of their workers' talent, and 35 % are prepared to invest in training (European Commission. Directorate-General for Employment, Social Affairs and Inclusion, 2023). Both skills-sourcing remedies involve learning. Work-related learning will probably be of more importance because it lets organisations and individuals learn at the same time. However, not having skills and having skills without using them are different situations. It is not correct to assume that workers' skills are always accessible to employers and that workers will automatically deploy all their skills. Both lacking skills and skills underutilisation can cause performance gaps.

Employee engagement is the level of effort exerted by employees at work while drawing on their knowledge and skills and leveraging their attitudes. It is not only a worker trait but a situational variable affected by workplace context. Organisations gain access to their employees' skills by providing a work environment that encourages them to exert work effort and draw on their skills. When this happens, firms also benefit from higher returns on their organisational investments in human capital because engaging workers promotes work effort and productive behaviour and reduces staff turnover (Bruursema et al., 2011, Carpenter & Berry, 2017, Jensen et al., 2010, Lebrón Tabak et al., 2018, Priesemuth et al., 2013, Serenko, 2019, Serenko & Bontis, 2016).

Organisations that successfully incentivise their employees to draw on their skills in the interest of the organisation turn their workers' human capital into an organisational resource and may base their competitive advantage on it (Nyberg et al., 2014, 2018, Nyberg & Moliterno, 2019, Ployhart et al., 2014).

## 1.3. Learning: from skills to expertise

Learning is a powerful force that is deeply ingrained in humans. While learning is often viewed as both the process and the outcome of participation in learning activities, the process and the outcomes of learning need to be treated as separate phenomena. The outcome from learning is defined as a relatively permanent change in skills, knowledge, motivation, abilities and attitudes produced by experience of (repeated exposure to) a situation.

The process of learning is guided by two processes: skills acquisition and skills development (Parker et al., 2010).

(a) Skills acquisition concerns the learning of narrow skills and knowledge, such as learning to operate a new machine, learning a new command for a programming language or learning to use AI applications. Skills acquisition is a relatively well-studied phenomenon (e.g. Ford et al., 2018, Gegenfurtner, 2011, Li & Pilz, 2021, Schoeb et al., 2020, Tonhäuser & Büker, 2016, Yang & Watson, 2020).

(b) Skills development concerns outcomes of work-related learning that lead to the development of expertise and practical wisdom, a concept guided by the Aristotelian virtues of praxis and phronesis (see more in Section 1.4; see also Goldman, 2016, Hardy & Kaiser, 2016, Herling & Provo, 2000). Skills development implies a movement towards a more progressive, mature state, characterised by increasingly complex ways to organise knowledge and to leverage qualitatively different learning strategies.

The report focuses on skills development because it is a process that is particularly relevant in the volatile, uncertain, complex and ambiguous (VUCA) environments faced by firms confronted with technological and organisational change.

In stable environments, the past guides behaviour (Watkins & Marsick, 2023). Stable contexts produce

a consistent stream of information, which can be codified in rules and stored in the long-term memory. Each time workers encounter a situation, they will retrieve the domain-specific information already stored in the long-term memory, and ways to deal with the current situation will become available for enactment. When situations present themselves often enough, the identification of the course of action and the consequent deployment of skills can be embedded into a routine and performed 'automatically' (Kahneman, 2011, Nelson & Winter, 1982, Winter, 2013).

This is no longer valid in VUCA environments. In fluid environments, when operations are complex and there is uncertainty or ambiguity in the interpretation of what the situation at hand requires, the past can no longer guide behaviour. Each instance must be treated as unique, and responses must be reconfigured each time to respond to the unique contextual stimuli. These situations require adaptive practices (Watkins & Marsick, 2023) and problem-solving (Robertson, 2016) as workers look for solutions for unfamiliar problems. When routines cannot be relied upon, the search for solutions to unfamiliar work-related problems requires effort.

The wave of new technologies that the twin transitions bring along results in a VUCA environment. The Industry 5.0 framework suggests that workers' skills, supported by human-centric technologies, may be key to successfully navigating these transitions. Empowered workers in VUCA environments have the autonomy to engage in the search for efficient solutions to work-related problems. The quality of those solutions is influenced by workers' skills and their ability to deploy these skills in a way that is beneficial for all stakeholders involved.

## 1.4. Skills development: expertise and practical wisdom

Striking the right balance between the interests of all those affected by a solution requires tact, expertise, understanding of context and a developed moral framework. In this report, we will use the term 'skills development' as an overarching concept that encompasses three constructs characterising workers' ability to achieve this balance in dynamic environments:

(a) expertise;
(b) phronesis;
(c) praxis.

The development of expertise brings with it the capacity to quickly identify the most salient features of an ambiguous situation and use these features (and the trade-offs implied by the situation and the practice) to devise the course of action with the best outcomes. Phronesis is the Aristotelian virtue that explains how mature decision-making is motivated and shaped by substantive moral aspirations and cognitively guided by moral emotions (Kristjánsson et al., 2021).

Phronesis can be regarded as a form of ethical expertise (De Caro et al., 2018). In organisational settings, phronesis also encompasses an organisation's expectations (Bardon et al., 2017), the concept of being a good citizen in the organisation and having in mind the repercussions of one's actions for the community (Kristjánsson, 2014, Shotter & Tsoukas, 2014a). This wisdom is practical because it is applied to practical (organisational) problems.

Phronesis complements praxis – the ability to use theory to solve complex organisational and workplace problems from a technical point of view (Schwartz, 2011, Schwartz & Sharpe, 2010). It incorporates the desire to perfect one's skill and to adhere to the 'standards of excellence' that are required by the practice to characterise a job well done (Shotter & Tsoukas, 2014b). Praxis is the ability to do things right; phronesis concerns the ability to do the right thing.

In organisational settings, expertise, praxis and phronesis play a fundamental role because they help align solutions to work-related problems and stakeholder interests (Steyn & Sewchurran, 2019, Lapsley, 2019). The green and digital transitions and recent technological advancements are the epitome of VUCA

environments in which learning and the ensuing skills development (which lead to practical wisdom and expertise) are necessary for thriving. For all these reasons, the report adopts a means of measuring skills development that is informed by the concepts of expertise and practical wisdom.

Mastering a job or profession is a matter of scale, which develops through stages. Novices new to the activity may have the knowledge and know-how to perform basic tasks using simple skills. With guidance from an expert, novices accumulate experience and may progress to be beginners. Beginners begin to work autonomously but still need support and guidance. Beginners learn and gain more experience and may become competent, proficient, masters and – after years of expertise accumulation – experts.

Expertise refers to an individual's high-level domain-specific competence that enables sustained high performance (Ericsson, 2018). Experts can be defined in a narrow or broad sense. The narrow definition depicts experts as top performers in a particular field in a structured environment, such as an international chess master, a particularly good violin player or an exceptional sportsperson. In the broad definition, which is adopted in this report, experts are professionals or workers who achieve a high degree of success in their occupation.

The progression of learners on the path to becoming an expert is not a steady path of improvement; going from the novice to intermediate level is sometimes accompanied by a dip in performance, and for certain tasks intermediate experts can outperform experts.

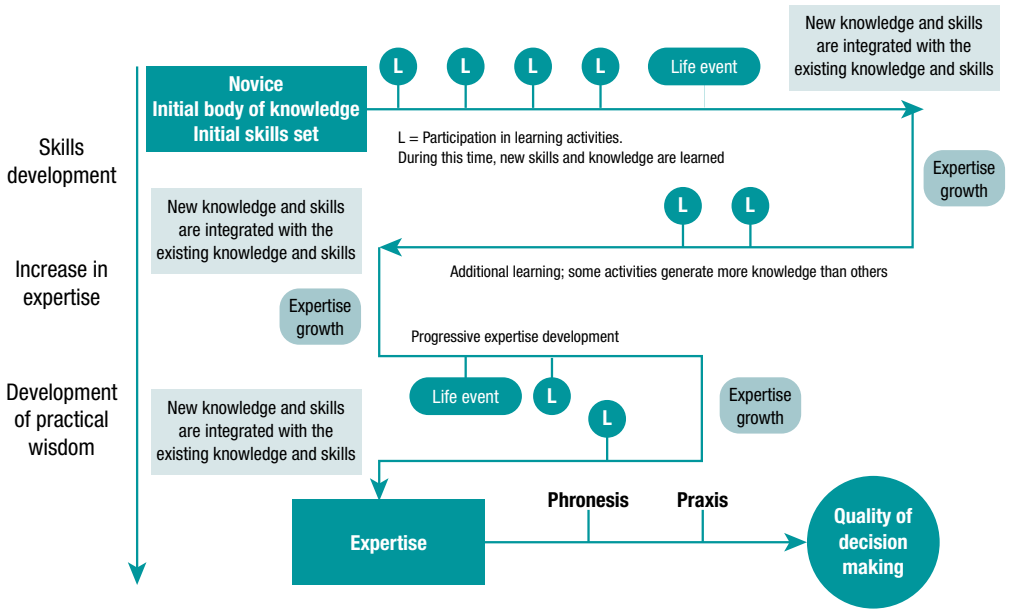
The complex and unpredictable journey of learning and developing expertise is summarised in Figure 1. The initial step is always skills acquisition: simple and narrow skills or basic knowledge must be acquired during learning activities. These improve the learner's ability to perform a simple activity well and improve the execution of practical tasks. At the beginning of the journey to expertise, there is a strong connection between the development of a specific skill, or the acquisition of new knowledge, and participation in learning activities. In Figure 1, the letter 'L' in a circle marks the instances of participation in learning activities. The acquisition of new skills may not contribute immediately to the development of expertise. While participation in learning activities punctuates the learning journey, it could take a string of learning activities before a jump in expertise occurs.

This is because expertise requires the integration of diverse experiences, new knowledge, and learned skills and behaviours (this process involves the development of a competence). This process is not a solitary journey. It requires instruction (and instructors) and the influence of peers. Expertise development is the process that integrates the skills acquired in learning activities ('L' in Figure 1) with the existing skill set and stock of knowledge, and it is aided by autonomy and reflection (Ericsson, 2020, Ericsson et al., 1993, Nathan, 2021, Tabak & Kyza, 2018).

Expertise is qualitatively different from skills acquisition (the learning of a narrow skill). Experts learn what to do and how to do it, but also what not to do (Gartmeier et al., 2008, Minsky, 1994, Parviainen & Eriksson, 2006). Expertise brings about qualitative differences that increase the efficiency of learning and performance. These qualitative differences are related to experts' increased selectivity of attention, pattern recognition and ability to recall from memory. Over time, practitioners learn to focus on the most important stimuli, become better at recognising stimuli, increase their ability to recognise a situation with partial information and become faster at recalling domain-specific information from memory.

Initially, expertise tends to be domain-specific (Robertson, 2016) and the transfer of learning between contexts is complex and difficult. As expertise develops, knowledge can be more easily transferred across situations (Yelon et al., 2013).

Figure 1. **Skills, learning and the development of expertise**




*Source:* Cedefop.

The development of expertise is directly linked to the development of practical wisdom (Dreyfus, 2008). When new knowledge cannot be simply assimilated in the existing frame of reference, learning is transformative, as learners change their understanding of the situation, changing meanings, perspectives, habits of mind and mindsets (Mezirow, 2000).

## 1.5. Overview of this report

EU organisations are facing momentous change driven by the green and digital transitions, AI and a host of emerging technologies that are poised to change tasks and jobs. The twin transitions produce a volatile and complex environment in which learning and the ensuing skills development (which lead to practical wisdom and expertise) are necessary for thriving and resilient economies and societies.

The Industry 5.0 paradigm suggests that EU organisations may lean on work-related learning to successfully navigate the twin transitions. Using the Industry 5.0 concept as a guiding principle for skills policy implementation pays a double policy dividend: it stimulates skills utilisation and skills development simultaneously. In companies that have objectives beyond bottom-line profitability, the combination of technical (praxis) and moral (phronesis) expertise is important for corporate social responsibility and environmental sustainability.

While there is a wealth of research and analysis on training and learning participation and skills attainment, the development of practical wisdom and expertise in the general population is relatively under-studied. To fill this gap, the report focuses on the skills development of workers. The empirical findings presented in this report are based on Cedefop's 2023–2024 European Training and Learning Survey (ETLS). The survey zooms in on learning and learning activities of EU workers for work and aims to fill the gaps in the understanding of what drives work-related learning, an activity that is crucial for the advancement of Industry 5.0. Chapter 2 explains the survey concept and presents its main features and summary statistics. Chapter 3 looks at workplace learning, and Chapter 4 looks at the links between work-related learning and skills development. Chapter 5 concludes and summarises.

CHAPTER 2.

# Cedefop's European Training and Learning Survey

## 2.1. Introduction

The ETLS is a Cedefop survey that gathered data from employed workers (between 16 and 64 years of age, in salaried employment) on their engagement with learning at work (Box 1). It complements other Cedefop surveys such as the European Skills and Job Survey and its opinion surveys on VET, and Eurostat's Adult Education Survey and Continuing Vocational Training Survey. The ETLS aimed to enhance understanding of the contextual workplace factors influencing the different types of work-related learning that workers engage in to potentially improve their job performance and expertise.

This chapter introduces the main variables used for this report. It describes and presents the empirical measures of skills development and participation in learning activities ([1]).

Box 1. **Cedefop ETLS – survey details**

The ETLS focuses on learning while at work and learning for work. There are very many typologies of work (Cairns, 2022); therefore, the ETLS focuses on the job in which respondents spend the most hours. The ETLS tries to also capture workers without regular contracts by asking about the permanent or temporary nature of the respondent's 'contract or agreement'. The survey makes use of self-reported measures. While these may suffer to some extent from method and social desirability biases, most ETLS topics are not very sensitive and are not a reason for untruthful reporting.

Fieldwork for the ETLS took place between October 2023 and February 2024, following extensive summary development, cognitive and pilot testing phases, and rigorous translation of the survey instrument into all EU languages (plus Icelandic and Norwegian) between 2021 and 2023. At the end of the fieldwork, the dataset totalled 44 752 interviews. The survey was carried out in all 27 EU Member States plus Iceland and Norway.

To ensure that it was representative of the European adult workforce, the data were collected using computer-assisted telephone interviewing (CATI) random sampling or online, computer-assisted web interviewing (CAWI) random sampling from a representative panel in each country. In most countries, the samples were topped up using an online (CAWI) supplement from commercial (non-probability) registries. Where needed, sampling weights were used to merge probability and non-probability parts of the sample. The exact composition of the sample in the 29 countries surveyed is available in the ETLS technical report.

To maintain consistency across survey modes (CATI and CAWI are known to suffer from different types of biases), the questions in the online questionnaire (CAWI) were presented in the same way as in the questionnaire used for the telephone interviews (CATI). The CATI-mode questionnaire took about 20 minutes to complete. As the same questionnaire administered through CAWI took less than 20 minutes to complete, additional questions were incorporated in the web-based survey questionnaire. In this report, the analyses have been carried out using the questionnaire items that are present in the CATI and CAWI samples. Sometimes, additional variables present in the CAWI sample are used to give nuance to the results obtained from the whole sample. In all instances, weighting is applied to correct for the survey design and for any remaining discrepancies between the survey sample and the target population in terms of the distribution of important benchmark variables across countries. These include age, gender, education (measured by International Standard Classification of Education (ISCED) level), occupation (by International Standard Classification of Occupations (ISCO) category), industry (by Statistical Classification of Economic Activities (NACE) category) and region (by NUTS (nomenclature of territorial units for statistics) designation).

*Source:* Cedefop.

([1]) Descriptive statistics for questionnaire items and scales can be found in Annex 1.

## 2.2. Skills development

Skills development is a holistic measure of learning informed by the concepts of expertise and practical wisdom. The questionnaire used survey items to capture improvements in different facets of workers' job performance and understanding of their jobs over the 12 months prior to the interview. In turn, these items reflect improvements in both tacit and explicit knowledge. The questions used to measure skills development are shown in Table 1. The first three items in Table 1 were included in the questionnaire directed at the whole sample. Items 4 to 11 were asked of the online (computer-assisted web interviewing (CAWI)) sample only.

Table 1. **Survey items used to assess skills development**

| | In the last 12 months / since you started your main job, to what extent have you become better, if at all, at any of the following aspects of your work? |
|---|---|
| 1 | At understanding how my work can be done better |
| 2 | At solving problems at work |
| 3 | At doing my job tasks with less supervision |
| 4 | At understanding the tasks I need to do |
| 5 | At knowing whether I am doing a good job |
| 6 | At describing how I do my work to colleagues |
| 7 | At avoiding mistakes at work |
| 8 | At making better decisions at work |
| 9 | At performing different job tasks |
| 10 | At doing my job tasks faster |
| 11 | At doing my job tasks in a way that does not harm the environment, for example by reusing or recycling materials, reducing the waste of resources or making better use of energy |

*Source:* Cedefop.

This list is concluded by a catch-all question aimed at capturing overall skills development: 'In the last 12 months / since you started your main job, to what extent have you become better at doing your job overall?'

The scale formed by the first three items has good statistical properties (Cronbach's alpha = 0.81) ([2]). The correlation between the scale and the catch-all measure of skills development is relatively high (Pearson correlation coefficient = 0.63), and the addition of the overall measure of skills development to the scale improves the quality of the scale (Cronbach's alpha = 0.83) ([3]). Finally, adding the remaining items (which are only available for the online part of the sample, and consequently so is the scale) improves the scale even more (Cronbach's alpha = 0.93) ([4]).

The results suggest the presence of an underlying factor that can influence all the items in the scale. Respondents who experienced a relatively high increase in skills development (a concept based on the development of expertise and practical wisdom) would score high on all the items. It is clear that many of the items are linked to practical wisdom. The ability to make better decisions, the ability to understand what needs to be done and the ability to detect whether one is doing a good job all have a moral component and are connected to flourishing (Demerouti et al., 2015), at least in the workplace.

([2]) Cronbach's alpha is a measure of the reliability of the scale: the closer to 1, the better the scale.
([3]) Factor analysis confirms that all four items load on just one factor.
([4]) Factor analysis confirms that all 12 items load on just one factor.

## 2.3. Engagement in learning

Skills development is the result of the process of learning new things and integrating them with the previous stock of knowledge and skills. This is a highly non-linear process, so it is hard to say when new knowledge and skills lead to the development of expertise or practical wisdom. The ETLS approach to measuring work-related learning complements other learning surveys such as Eurostat's Continuing Vocational Training Survey, which zooms in on the financial aspects of training, or the Adult Education Survey, which looks at different learning types. The ETLS's focus is on professional learning (rendered in the questionnaire as 'learning for work'), which may follow from (discretionary) employer-organised learning activities and from learning activities initiated by workers.

Engagement with learning activities has multiple dimensions. The intensive dimension refers to the number of hours spent on learning activities, the quality of the instruction, the quality of material used and mode of delivery, and the attention paid to the design of the learning experience. The extensive dimension refers to the number of times workers engage with learning activities.

Due to limits on the survey interview's duration, the ETLS could not cover both learning engagement dimensions. The choice to focus the ETLS on the extensive dimension of engagement with learning activities was informed by the empirical stylised fact that survey respondents are more likely to accurately recall the number of times they participated in a learning activity over the course of the previous year than the intensity and quality of the training they took part in. Nevertheless, the measure of participation in work-related learning activities adopted by the ETLS remains partial, with scope for improvement.

Learning for work (as gauged by the skills development measure) complements employee empowerment. Empowerment puts employees in a position to assume broader responsibilities and work autonomously; therefore, they need to be able to do things right and do the right thing. When workers enjoy a great deal of autonomy, employers benefit from workers' voluntary behaviours that lead to efficiency gains (this can be defined as 'contextual performance'). These voluntary worker behaviours include learning, and workers with autonomy are in a better position to manage their personal learning. This process plays a key role in learning organisations or in organisations relying on workplace innovation (Evans & Waite, 2010, Grenier & Germain, 2015, Marsick, 1998, Oeij et al., 2017, Shin et al., 2017).

### 2.3.1. Learning activities

Taxonomies of learning activities, such as the one established by Eurostat, often distinguish between formal, non-formal, informal and random learning. The borders between these learning categories are sometimes fuzzy.

The ETLS follows a different logic and empirical strategy. It assesses the intensity of the engagement in learning on the basis of participation in various learning activities. The survey includes the following learning activities: employer-organised training outside work, employer-organised on-the-job training and personal learning activities (initiated by workers), such as the use of books, following one's own training, watching others, asking for help from colleagues, asking for help from supervisors, trial and error, reflecting on how to do one's job and learning while working ([5]).

### 2.3.2. Measuring employer-organised and self-initiated work-related learning

Firms do not have full discretion in the provision of training and other learning opportunities. Organisations provide, for instance, health and safety training that is often mandated by law or professional regulation. They also provide training that is necessary, for example induction training to newly hired or promoted workers. They may also provide training aimed at encouraging desirable workplace behaviours, such as addressing bullying and other types of harassment, toxic behaviours and discrimination, and training aimed at encouraging ethical behaviours.

Discretionary employer-organised provision of learning opportunities includes training and on-the-job

([5]) Descriptive statistics for all the survey questions used in the report, broken down by country, are provided in Annex 1.

training opportunities with the purpose of employee development. For example, it is in the organisation's interest to provide learning activities so that new technologies are proficiently used by their workers, machines are not damaged and costly mistakes are avoided.

To measure the provision of discretionary, employer-organised learning for work, the ETLS questionnaire asked respondents first whether they had taken part in any of the following types of training: health and safety training, induction training and training on workplace behaviours. Following this, respondents were asked about participation in other forms of work-related learning activities provided by the employer, other than the ones previously mentioned. This may, for example, entail training to work with a new machine or new administrative process, to apply a new technique or method or to use new software. This measure of discretionary employer-provided learning activities – referred to as employer-organised training in this report – can be provided off the job ('while not doing your job tasks') or on the job ('while doing your job tasks').

Alongside employer-organised training, there are learning activities that are initiated by workers. To correctly assess individuals' participation in self-initiated learning activities to develop their job-related skills, the survey question contained the following prompt, 'Now think of activities for **learning new things for your work not organised by your company or organisation**', and then asked respondents: 'In the last 12 months / since you started your main job, how often have you done any of the following activities to learn new things for your work **on your own initiative?**' Table 2 presents a list of all learning activities assessed in the ETLS.

Table 2. **Learning activities – discretionary employer-organised learning activities (panel A) and self-initiated learning activities (panel B)**

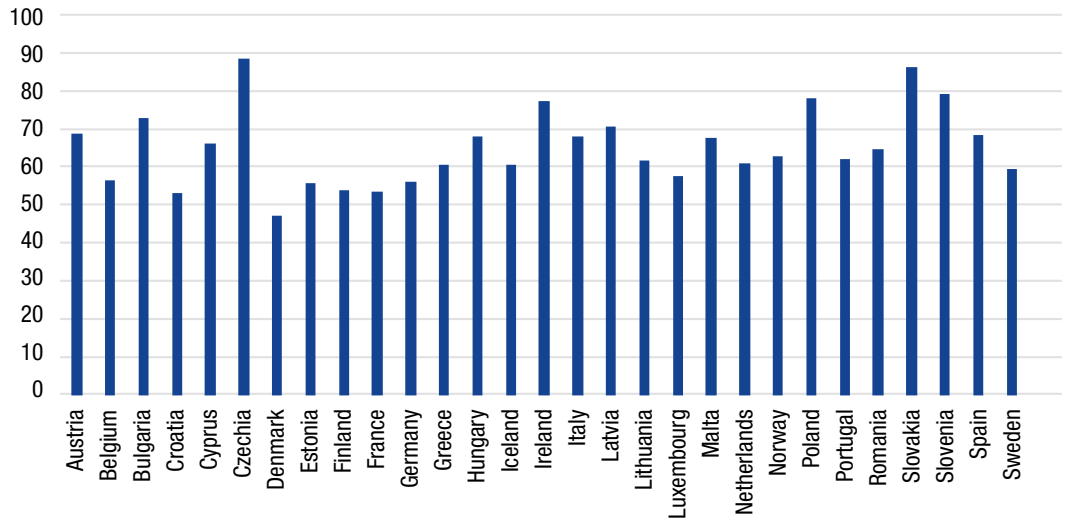
| |
|---|
| **Panel A: Employer-organised learning activities**<br><br>**In the last 12 months / since you started your main job, how often have you participated in any of the following training activities related to your work that were organised by your company or organisation?**<br><br>**Please consider all training activities done inside or outside your workplace, in person or online.** |
| Training while not doing my everyday job tasks, for instance in a classroom or at another training facility |
| Training while doing my everyday job tasks |
| **Panel B: Self-initiated learning activities**<br><br>**Now think of activities for learning new things for your work not organised by your company or organisation. In the last 12 months / since you started your main job, how often have you done any of the following activities to learn new things for your work on your own initiative?**<br><br>**Please consider all activities done in the workplace or elsewhere (e.g. at home), both during and outside working hours.** |
| Using books, manuals, or audio or video materials, including those available online (videos, podcasts) |
| Learning through doing my work |
| Trying out different or new ways of doing my work |
| Seeking the advice of more experienced colleagues |
| Seeking the advice of my manager or supervisor |
| Watching or listening to colleagues as they do their work |
| Thinking of ways to do my work better |
| Participating in training, either in person at a classroom or at another training facility or online |

*Source:* Cedefop.

The ETLS data were used to devise an index of participation in work-related learning that sums up the frequency of participation in all learning activities. The index builds on the assumption that learning happens in many different ways and contexts and the notion that participating more frequently in learning activities contributes to higher levels of knowledge development and learning.

The ETLS demonstrates that participation in induction training (for those workers who have been with their employers for less than two years), health and safety training and workplace conduct training was widespread in European countries (Figure 2). Some 63 % of all workers received at least one of the abovementioned forms of training. There is considerable variation among the different types of training, with 63 % of new hires receiving induction training, about 55 % of workers undertaking health and safety training or instruction and 34 % undertaking workplace behaviour or conduct training. There is also marked variation among countries with regard to participation in at least one of the abovementioned types of training; for instance, the incidence is lowest in Denmark and highest in Czechia.

Figure 2. **Workers who took part in induction training (for those newly hired), health and safety training and/or training on aspects of workplace behaviour, by country (%)**




NB: Results are weighted.

*Source:* Cedefop based on ETLS data.

Employer-provided learning activities aimed at work-related learning (in the rest of the report, this will be referred to as employer-organised training activities) can be delivered in the form of off-the-job training, that is, training undertaken while not doing one's job tasks (away from or at the workplace, in person or online), or in the form of on-the-job training with a designated instructor or trainer, while workers are doing their jobs ([6]). The frequency of participation in these two types of employer-organised training activities is recorded using a five-point Likert frequency scale ('never', 'rarely', 'sometimes', 'often' and 'very often').

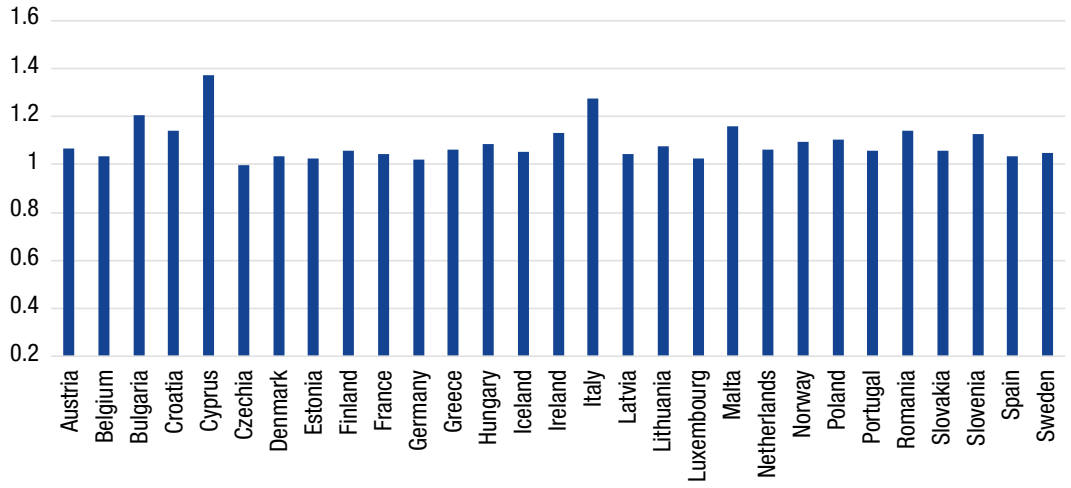
To measure the relative incidence of the two forms of training delivery, the frequency of participation in on-the-job training is divided by the frequency of participation in training away from one's job (off-the-job training). This statistic ranges from 0.2 (never participated in on-the-job training but participated in off-the-job training very often) to 5 (participated in on-the-job training very often but never took part in off-the-job training). An average relative incidence above 1 means that on-the-job training delivery

([6]) This distinction is not equal to that between formal and non-formal training. Training delivered while not doing one's job tasks may include participation in employer-provided formal and non-formal courses outside or at the workplace, typically outside working hours. Also, on-the-job training may include formal learning activities, such as apprenticeships or training delivered by external providers at the workplace.

is more frequent than off-the-job training delivery. An average relative incidence below 1 means that on-the-job training delivery is less frequent than off-the-job training delivery.

The average relative incidence is 1.08, which indicates that participation in on-the-job training is slightly more frequent than participation in off-the-job training (Figure 3). While the relative incidence of on-the-job versus off-the-job training varies among countries, it is always at or above 1. The countries with the highest relative incidence of on-the-job training are Cyprus, Italy and Bulgaria. Czechia is the country with the lowest relative incidence of on-the-job training.

Figure 3. **Relative frequency of participation in on-the-job and off-the-job training, by country**




NB: Data are weighted. A value above 1 indicates that, on average, participation in on-the-job training is more frequent than participation in off-the-job training.

*Source:* Cedefop based on ETLS data.

Alongside employer-organised training activities, the ETLS covered participation in self-initiated learning activities. These refer to activities that are not organised by the company or organisation. The adjective 'self-initiated' underlines the notion that engagement with these learning activities should be considered a form of citizenship behaviour when directed towards the development of skills that are important for one's current job (Organ et al., 2006, Parker, 2017).

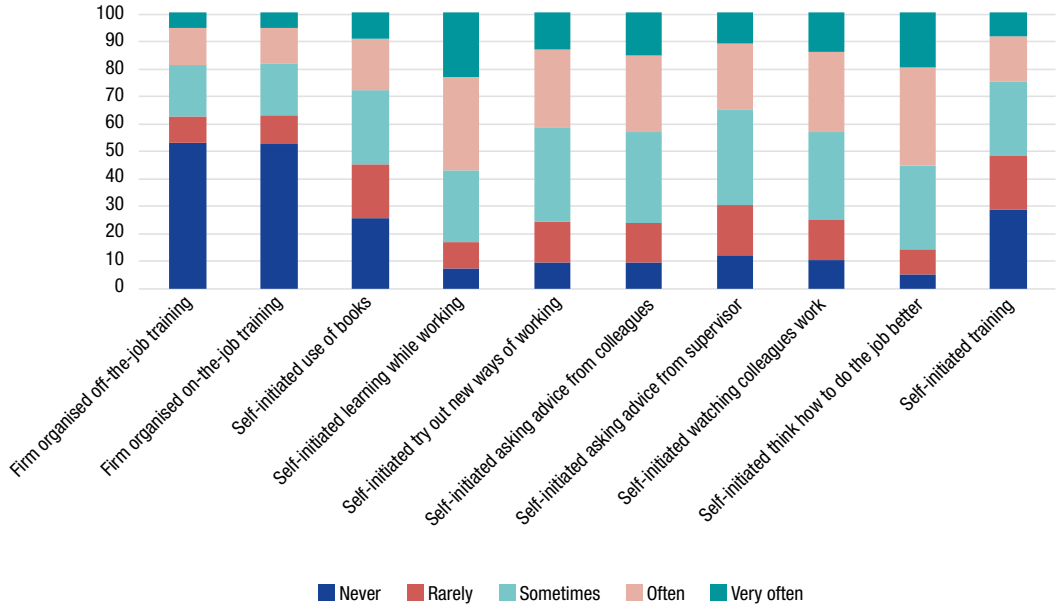
Following the literature about the measurement of workplace learning, the learning activities surveyed in the ETLS are as follows: participating in one's own training (online or offline); using books, manuals and online resources; asking for help from supervisors; asking for help from colleagues; observing colleagues while they work; trial and error; learning by doing; and reflecting on how to do one's job better (Decius et al., 2019, Grosemans et al., 2020, Kyndt et al., 2013).

Most of these learning activities fall into the category of informal learning, as they tend to be non-structured. However, some self-initiated training and the use of books and other online materials may also have formal or non-formal learning features, as they may take place within an educational setting and be used to attain a qualification recognised by the education system. Learning while working, which the academic literature would describe as incidental learning, is the only learning activity that could be classified in the Eurostat taxonomy as random learning. The same is not true for observing others, because the purpose of learning while watching others is explicitly expressed in the survey question. As with employer-organised training, participation in self-initiated learning is recorded on a five-point Likert frequency scale (never, rarely, sometimes, often, very often).

The analysis of the frequency of participation in the various learning activities listed above shows that far from all European adult workers benefit from learning opportunities provided by their employer

(Figure 4). About 50 % of workers do not participate in work-related employer-organised training, either off the job or on the job. For self-initiated learning activities, the share of workers in the category 'never' is markedly lower. This suggests that participation in self-initiated learning activities is much more common than participation in employer-organised training.

Figure 4. **Frequency of participation in various learning activities**




NB: Data are weighted.

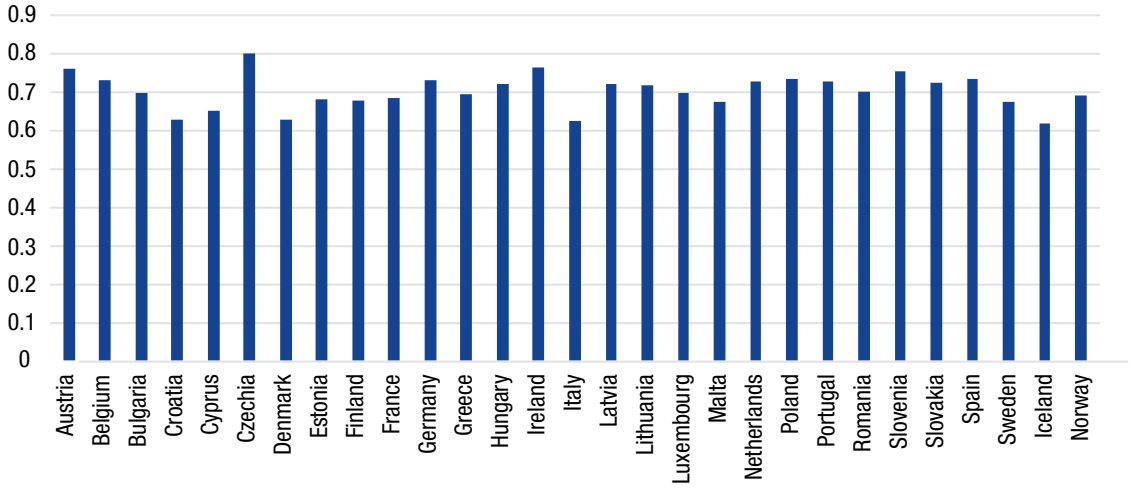
*Source:* Cedefop based on ETLS data.

### 2.3.3. Comparing different learning types

The learning activities listed above can also be grouped in order to analyse the relative frequency of employee participation in all organised training, be it employer organised or self-initiated, in comparison with participation in all other self-initiated learning activities.

The average frequency of participation in all training divided by the frequency of participation in all self-initiated learning activities (excluding employee self-initiated training) is 0.70. This means that European workers participate less frequently in organised training than in all other voluntary learning activities combined. With a range from approximately 0.62 (Iceland) to 0.80 (Czechia), the differences among countries are limited (Figure 5).

Figure 5. **Relative frequency of participation in organised training in comparison with all other learning activities, by country**



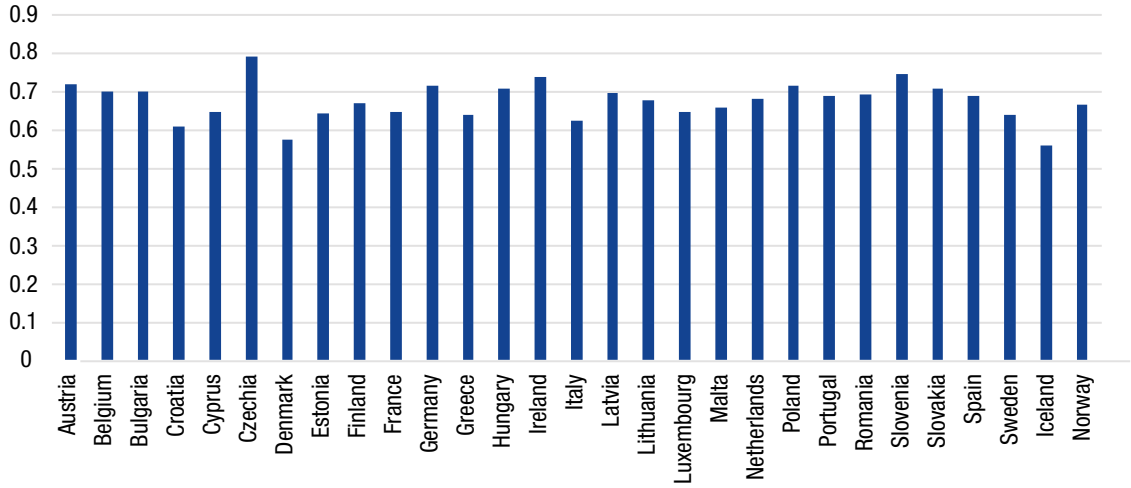

NB: Data are weighted.

*Source:* Cedefop based on ETLS data.

To compare the roles of employers and workers in organising learning and training activities, participation in employer-organised learning activities can be compared with participation in all self-initiated learning activities. The relative frequency of employer-provided learning activities compared with self-initiated learning activities is 0.67, signalling that self-initiated learning activities take place more frequently than employer-organised learning activities (Figure 6).

The relative frequency of participation in employer-organised learning activities is lowest in Iceland, which means that the difference in frequency between voluntary learning activities and employer-organised learning activities is highest for Icelandic workers on average. The relative frequency of participation in employer-organised training is highest in Czechia.

Figure 6. **Relative frequency of participation in employer-organised learning activities and in self-initiated learning activities, by country**




NB: Data are weighted.

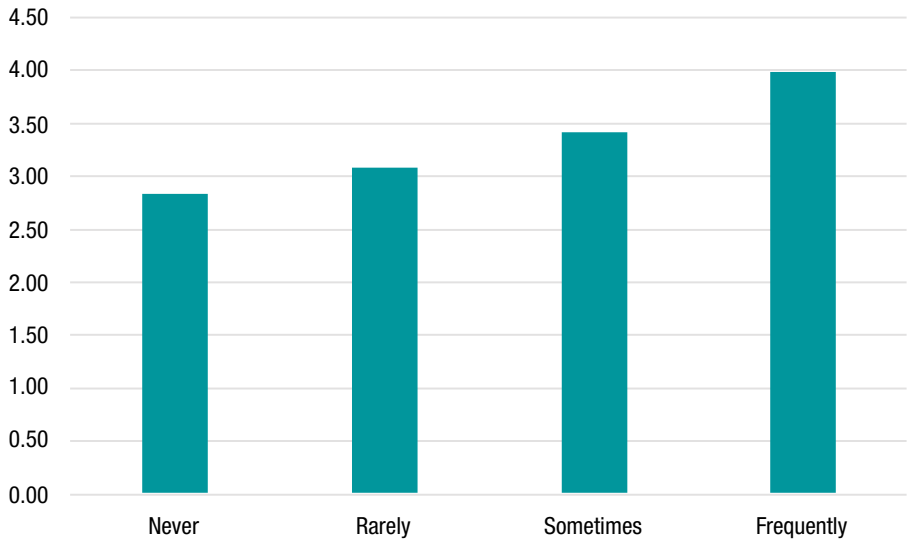
*Source:* Cedefop based on ETLS data.

For policy, it is important to understand the relationship between participation in employer-organised learning activities and participation in self-initiated learning activities. These learning activities can be complements to or substitutes for each other. If they are complements, an increase in the frequency of participation in one type of learning activity will also increase participation in the other type. If they are substitutes, an increase in the frequency of participation in one type of learning activity will be accompanied by a decrease in the frequency of participation in the other type.

Observational studies suggest a degree of complementarity between training provided by the organisation and informal learning activities (Ferreira & Velinças, F., 2017). However, such results may be subject to bias. A better way to examine this relationship is to look at changes in participation in self-initiated learning activities following an exogenous increase or decrease in employer-organised training (or vice versa). Given that this requires data sources at different points in time, this analysis set-up is very difficult to implement using cross-sectional data.

With this limitation in mind, the average frequency of participation in self-initiated learning activities shows a positive relationship with the index of frequency of participation in employer-organised learning activities (Figure 7). The average frequency of participation in self-initiated learning activities is highest when the participation in employer-organised learning activities is highest, and it is lowest when the participation in employer-organised learning activities is lowest.

Figure 7. **Average index of frequency of participation in self-initiated learning activities and frequency of participation in employer-organised learning activities**




NB: Data are weighted. The x-axis shows the levels of the index of frequency of participation in employer-organised training activities, averaged across the two modes of participation (on the job and off the job). The index of participation in employer-organised activities is subdivided into four categories: 'never' (for both on- and off-the-job training), 'rarely' (for both on- and off-the-job training, or 'sometimes' for one and 'rarely' for the other), 'sometimes' (for both on- and off-the-job training, or 'sometimes' for one and 'often' for the other) and 'frequently' ('often' or 'very often' for both on- and off-the-job training). The 'often' and 'very often' response categories for on- and off-the-job training are combined into the category 'frequently'. The height of each bar represents the average index of participation in self-initiated activities obtained by averaging the frequency of participation across the self-initiated learning activities.

*Source:* Cedefop based on ETLS data.

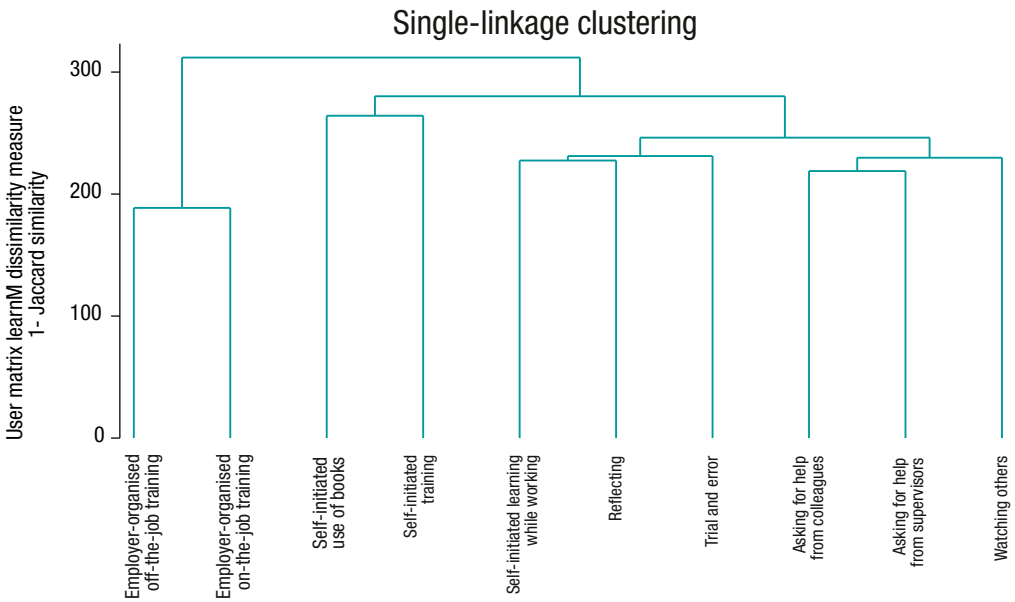
Cluster analysis (Rokach, 2025) was used to identify patterns of participation in different learning activities (Figure 8). This shows there are three learning type clusters, which distinguish more formalised forms of learning from less formalised ones:

(a) the employer-organised learning activities group, namely on-the-job and off-the-job training;
(b) a group that includes the use of books and other learning materials and the undertaking of self-initiated training;
(c) the social–reflective learning group, consisting of two subgroups that converge immediately after their formation:
  (i) the social cluster (watching others, asking for help from colleagues and asking for help from supervisors);
  (ii) the reflective cluster (trial and error, reflecting and learning while working).

This pattern appears to be robust to the choice of the clustering algorithm, in the sense that the single-linkage and complete-linkage algorithms used to derive panel A and panel B in Figure 8 lead to qualitatively similar results ([7]).

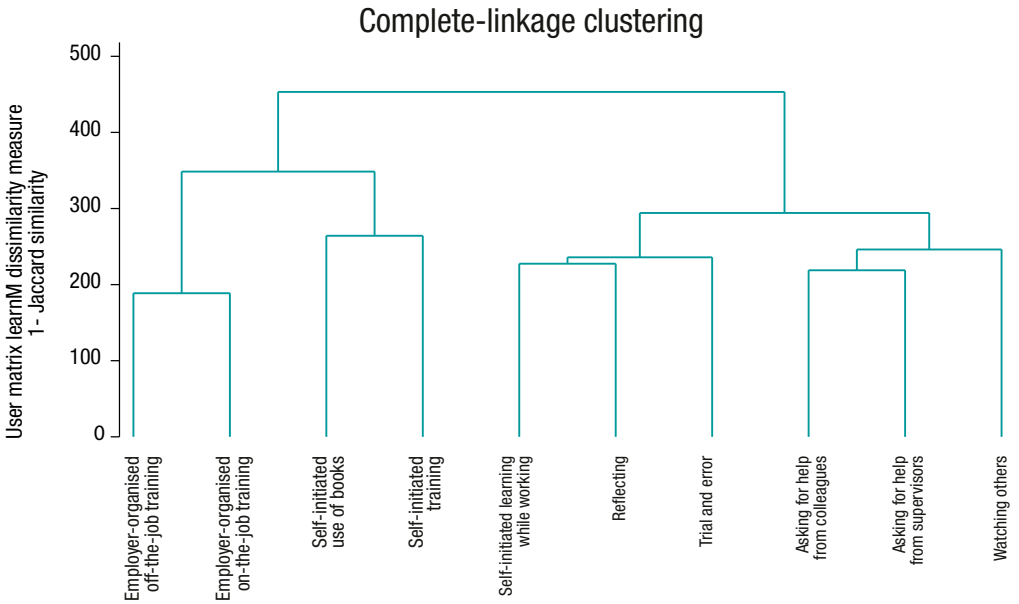
Figure 8. **Clustering of participation in learning activities: single-linkage clustering (panel A) and complete-linkage clustering (panel B)**

**Panel A**




([7]) In single-linkage or nearest-neighbour clustering, the distance between two clusters is determined by a single pair of elements: the two elements (one in each cluster) that are closest to each other. In complete-linkage or farthest-neighbour clustering, the link between two clusters contains all element pairs, and the distance between clusters equals the distance between the two elements (one in each cluster) that are farthest away from each other. For more information, see Everitt et al., 2011.

**Panel B**




*Source:* Cedefop based on ETLS data.

One way to make sense of these clusters is to interpret them based on the ways people prefer to learn: a relatively formalised mode of learning sponsored by the firm, an independent learning mode (through books or one's own training), a learning mode involving others (help from colleagues and supervisors) and, finally, a more reflective learning mode based on trial and error and experimenting at work.

At this stage, however, this distinction will not be pushed further. , An index of engagement in learning activities has been created by averaging the frequency of participation in all learning activities (DeVellis & Thorpe, 2022), which can be interpreted as a quantification of learning effort.

The correlation between this learning engagement index and the skills development scale is high (0.58), suggesting that the relationship between engagement in learning activities and simultaneous engagement in skills development is strong. This suggests that learning episodes resulting from participation in learning activities are quickly incorporated into the learner's pre-existing body of knowledge. This new configuration of knowledge and skills spur the development of expertise and practical wisdom – that is, skills development. The learning–skills–expertise integration process is not deterministic. The integration of new knowledge into a pre-existing body of knowledge requires the right conditions. Therefore, it is entirely possible that the knowledge gathered during the participation in learning activities would not stop here and could support additional skills development in the future.

This interpretation is supported by the analysis of questionnaire items on the usefulness of the learning methods posed to online (CAWI) respondents. They were asked to rate the usefulness of the 10 learning activities surveyed in terms of helping them become better at their jobs. These 10 items were used to derive a scale that measures the breadth of the learning experience, based on the idea that respondents who recognise the contribution of many learning activities to their development will tend to have a broader learning experience than respondents who recognise the importance of only few of the learning activities for their development. The scale has good proprieties (Cronbach's alpha = 0.89) The correlation between the breadth of the learning experience and skills development is positive and sizeable (correlation coefficient = 0.58).

CHAPTER 3.

# Learning in the workplace

## 3.1. Introduction

Industry 5.0 is about the deployment of technology that enhances workers' capabilities. This is the general premise of human-centred technological change. In the current debate about the rapid diffusion of new technologies and their adoption in workplaces, low-level or lacklustre worker participation in training and other developmental activities is a policy concern. This concern is reflected in policy documents such as the Union of Skills communication, which claims that '[o]ne major obstacle to taking up training among low-skilled adults is lack of motivation'. While the communication acknowledges that, for some workers, a lack of motivation may be linked to negative experiences in school, among other factors, it does not link the problem of low levels of participation in training and other developmental and learning activities to workplace characteristics.

In research, the importance of workplace characteristics for participation in learning is well documented (Cappelli, 2015, Korpi & Tåhlin, 2009, 2021, Lazazzara et al., 2013). Empirical analyses of employees' participation in workplace training suggest that contextual variables linked to the workplace are more important than individual ones in determining access to and participation in training (Hornberg et al., 2024, Korpi & Tåhlin, 2021, Saar & Räis, 2016).

It is therefore important to view motivation as a multifaceted phenomenon comprising individual and contextual features – and not strictly as a narrow personal characteristic (Ryan & Deci, 2017). From this perspective, the workplace is important for workers' participation in learning activities because it is a supplier of learning opportunities and a motivator for participation in learning activities.

There is a variety of learning opportunities that organisations can offer, having different cost–benefit ratios, which – in the case of learning – do not always map fully map the benefits. The cost–benefit analysis for the induction, health and safety, and workplace conduct training that most companies offer is relatively simple; some of this training is mandatory, and in the case of induction training, it is obvious that it is useful. The ETLS indirectly shows this too, since most workers do receive this type of training.

In addition, employers offer learning opportunities when it is in their interest to do so, for instance when new technologies or new working methods are introduced (Antonioli & Della Torre, 2016). The cost–benefit analysis informing the decision to provide this type of learning opportunity is also relatively simple: except for job-automating technology, it is in the employer's interest that workers become proficient in using new technologies (so that costly machines are not damaged and are used in the right way) or proficient in the execution of new working methods. The clear benefits also influence the incentives to participate in training. For example, training concerning new machines and technologies is usually provided during working hours, whereas the incentive to participate in training outside working hours is comparatively weaker.

The cost–benefit analysis guiding the provision of discretionary learning activities aimed at improving workers' ability to contribute to the success of the organisation is the hardest to carry out. Benefits are especially difficult to calculate because they partly depend on workers' engagement, their willingness to apply their skills, knowledge and capabilities and the quality of their decision-making.

The difficulties managers face in linking worker participation in learning activities with skills development have already been highlighted; there is no simple way to tell whether, when and by how much participation in learning will improve workers' decision-making. Some of these benefits will materialize soon after participation in learning activities, but other will take time to materialize. Other difficulties further complicate the assessment of benefits. The expected time span over which the benefits will accrue must be estimated,

and the anticipated benefits must be discounted to calculate their value at the present time. There is also uncertainty about the time span because employment relations may be interrupted, technology may replace workers or workers may leave.

Firms providing opportunities that promote discretionary learning have elected to base their competitive advantage on the organisation's superior capability to leverage its human capital as an organisational resource (Nyberg & Moliterno, 2019, Ployhart et al., 2014). The provision of such opportunities must be accompanied by incentives to encourage workers to apply their skills. Analyses of such firms' data show the importance of these organisational choices for the provision of training (Barry et al., 2020, Russo, 2024).

A straightforward indication that the cost–benefit calculation is generally positive is the adoption of a learning culture – an organisational culture aligning incentives for learning and skills utilisation. A learning climate (Cangialosi, et al., 2020, Nikolova et al., 2014, Yu et al., 2018) offers incentives that induce workers to engage in learning activities. This can be achieved by linking career paths to learning new skills or managerial support for workers' participation in learning activities (Wallo et al., 2022). A learning climate can be reinforced by other organisational features such as job design, work complexity and/or job autonomy. These factors affect participation in learning activities (Russo, 2022) and induce workers to draw on their skills.

Analyses based on the 2019 European Company Survey suggest that only about 20 % to 25 % of EU establishments (with 10 or more employees) in the private sector have embraced this strategy (Eurofound & Cedefop, 2020, 2023). Establishments offering training to improve workers' abilities to contribute to the success of the organisation also tend to offer a variety of inducements (monetary inducements, interesting jobs, career opportunities, impactful mission and vision statements) to encourage organisational citizenship behaviour (OCB) and to maintain healthy management–employee relationships (Russo, 2024).

## 3.2. Learning: a matter of ability, motivation and opportunity

In this chapter, work-related learning is analysed considering individual and contextual factors and based on the idea that to learn, a learner must be receptive to a learning experience, even in the case of incidental learning. The ability, motivation and opportunity (AMO) model operationalises the idea that learning takes place in the workplace if employees have the ability to learn, the motivation to engage in learning activities and the opportunity to do so (Boon et al., 2018, Kellner et al., 2019) ([8]).

While the idea is intuitive, it is difficult to isolate personal or workplace features affecting only one of these components. For example, the opportunity to do something also has an impact on the motivation to engage in the activity. Therefore, the AMO framework is used as a backbone, and variables and constructs are linked to each of the AMO components. The possibility that some variables may have a primary connection to one of the AMO components and secondary effects on the remaining two elements of the model is not excluded.

### 3.2.1. Learning ability

The ability to learn is innate; therefore, it is taken as a given in this analysis. However, people's confidence in their ability to learn and their ability to wait for the outcomes of learning are not. The construct 'ability' is derived from two survey items. The first one, 'I am confident in my ability to learn new things for my work', relates to perceived behavioural control or self-efficacy (Ajzen, 2002, Bandura, 2001). The second one, 'I am willing to make some sacrifices today to gain something good tomorrow', captures one's predisposition to invest time in the present for the purpose of future benefit or to delay gratification

([8]) The AMO model is very flexible and popular, but this comes at the price of less precision (Bos-Nehles et al., 2023). The main advantage of the AMO model is its ability to directly link the outcome of engaging in skills development with the ability, motivation and opportunity to engage in it.

(Di Maggio et al., 2016, Falk et al., 2023).
The two items are averaged into one index of a respondent's ability to learn, ranging from 1 to 4, with higher scores denoting a greater ability to learn.

### 3.2.2. Learning motivation

Intentional learning is driven by a motivation to learn. The motivation to learn is regulated by different mechanisms. The most well-known mechanism is the intrinsic–extrinsic dichotomy. Intrinsic motivation refers to internal motivational drives, fuelled by personal interests and enjoyment. Extrinsic motivation refers to drives fuelled by external incentives, such as higher pay or better career prospects. There are various types of extrinsic motivation; some of them are very similar to intrinsic motivation and others are quite different (Ryan & Deci, 2017).

To capture different motivation dimensions, the items included in the survey captured personal interest, external factors such as higher wages, the influence of values (e.g. sense of pride) and the force of workplace norms (Table 3).

Table 3. **Questionnaire items used for the foci of regulation of motivation**

| To what extent do you learn new things for work for the following reasons? | |
|---|---|
| **Item** | **Type of regulation** |
| I like learning new things | Intrinsic |
| I will get better pay | Extrinsic |
| It gives me a sense of pride | Identification |
| My manager or supervisor expects me to learn new things | Introjection |
| To learn is important | Integration |
| It is common for people at my workplace to learn new things for their work | Intrinsic |

*Source:* Cedefop.

While there is a clear distinction between the various types of regulation of motivation, in practice a person may be exposed to multiple sources of regulation (Litalien et al., 2017); therefore, the items in Table 3 have been scaled into an index of motivation, ranging from 1 to 4, with high values denoting exposure to a high number of foci of regulation ([9]). The index has good statistical properties (Cronbach's alpha = 0.77). The lowest theoretical value of the index is 1, which denotes the absence of any of the sources of regulation of motivation (or amotivation).

### 3.2.3. Learning opportunity

Having the skills and the motivation to learn does not have much value if employees do not have opportunities to learn. Opportunity is calculated by means of two ETLS questionnaire constructs characterising workplaces as restrictive or expansive learning environments. Expansive learning environments promote learning by enabling autonomy at work (since autonomy favours the use of multiple skills) and highlighting the social aspect of learning. This social aspect relates to cooperation within communities of practice and the availability of learning opportunities (Fuller & Unwin, 2004). Restrictive learning environments tend to hinder learning. They do so by restricting jobs to specific tasks, promoting job completion (thus limiting workers' ability to use a wide set of skills) and discouraging interaction with colleagues and supervisors (Fuller & Unwin, 2004).

([9]) The index would require multiple items for each source of regulation of motivation; however, to keep the length of the questionnaire to a manageable size, a 'one item per type of regulation' approach has been adopted.

Autonomy characterises workplaces where expansive learning can take place ([10]). Autonomy at work gives workers the opportunity to engage in activities, such as problem-solving, that promote learning new things (Table 4). Autonomy also enables workers to self-organise their activities, which lets them make time for learning and decide how to organise their learning.

The scale summarising autonomy has satisfactory statistical properties (Cronbach's alpha = 0.66). Higher values on the index correspond to higher levels of job autonomy.

Table 4. **Questionnaire items used for the foci of regulation of motivation**

| Item identifier | Questionnaire items |
|---|---|
| Q30_2 | [I can] decide how to do my work independently without any instructions |
| Q30_5 | [I can] deal with unexpected situations or problems |
| Q30_6 | [I can] work on a range of different tasks |
| Q32 | [I] can influence decisions affecting [my] work |

*NB:* The table does not show the question that introduced the items in the questionnaire because the items are derived from two different parts of the questionnaire.

*Source:* Cedefop.

Learning does not take place in a vacuum, and autonomy alone will often not be sufficient for learning to take place in practice. Learners need to be supported in their learning by supervisors and coworkers. Support from supervisors is especially important because they can help learners understand what they need to learn at different career stages. A scale capturing support for learning is based on three items: support from managers or supervisors, support from colleagues and the opportunity to discuss learning needs with a manager or supervisor (Table 5). The scale has good statistical properties (Cronbach's alpha = 0.73). High values correspond to a high degree of support for learning, a feature of expansive work-related learning.

Table 5. **Questionnaire items used for workplace support for learning**

| Item identifier | Questionnaire items |
|---|---|
| Q22_1 | [I have support from] my work colleagues |
| Q22_2 | [I have support from] my manager or supervisor |
| Q23_3 | I can discuss with my manager or supervisor what I need to learn for my work |

*NB:* The table does not show the question that introduced the items in the questionnaire because the items are derived from two different parts of the questionnaire.

*Source:* Cedefop.

Alongside autonomy and support – key features of work environments in which expansive learning can take place – one questionnaire item assessed the presence of help and support for newcomers (in the transmission of knowledge, including tacit knowledge) ([11]), a telltale sign of the presence of a community of practice (Farnsworth et al., 2016, Lave & Wenger, 1991, Wenger-Trayner et al., 2023).

([10]) Autonomy is part of an expansive learning environment. It has been developed as a separate scale because it affects both the opportunity to learn and learning motivation (Hackman & Oldham, 1976, Karasek, 1979, 2020, Oldham & Hackman, 2010).

([11]) This item is based on the degree of agreement with the following question: 'Newly hired people can rely on the help of their colleagues to learn their job'.

## 3.3. Additional drivers of learning at work

The AMO model captures the main drivers of learning for work. It can flexibly accommodate additional factors, be they individual or contextual conditions, which can be introduced to refine and extend the AMO model.

Additional individual (worker) characteristics included in the AMO model include:

(a) (individual) goal orientation;
(b) the presence of concrete learning goals;
(c) the perceived skills gap;
(d) displayed OCB;
(e) the quality of the relationship with management.

Individual goal orientation describes the approach to achieving goals, in this case learning goals. There are two primary goal orientations: performance goal orientation, whereby workers engage in activity to demonstrate their competence or ability, and mastery (or learning) goal orientation, whereby workers achieve goals to develop their competences or to acquire new skills and master new situations ([12]).

Performance goal orientation is further subdivided into approach and avoidance performance goal orientation (Vandewalle, 1997). Individual approach performance goal orientation is captured by the questionnaire item 'I learn new things for my work to demonstrate my abilities to others', while avoidance performance goal orientation is captured by the item 'I avoid new tasks if there is a chance that I might appear incompetent to others'.

The presence of concrete learning goals was introduced in the AMO model because of its importance in the theory of planned behaviour (Ajzen, 2005, 2015, 2020). The concreteness of the learning goal describes the respondents' knowledge of what they needed to learn, and it is captured by the questionnaire item 'I know what I need to learn for my work'.

'Skills gap' describes the need to develop one's skill and the ability to assess the impact of the gap on subsequent engagement in learning activities and skills development. The questionnaire item relevant to this area is retrospective: 'Please think about your situation 12 months ago / at the time you started your main job. At that time, to what extent did you need to develop your work-related knowledge and skills?'

The frequency of performed OCB has been introduced as a proxy for workers' investment in the workplace. This is investment in the development of firm-specific skills and the acquisition of firm-specific knowledge and efforts to improve the functioning of the workplace that may not result in an immediate reward. OCB concerns voluntary behaviours that can be classified as 'going beyond the call of duty' or 'going the extra mile'. OCB includes the exertion of effort at work, helping colleagues and suggesting ways to improve operations (Table 6).

Table 6. **Questionnaire items used for OCB**

| Item identifier | How often do you do the following things at work without being specifically asked by your employer? |
|---|---|
| Q44_1 | I help colleagues |
| Q44_2 | I put more effort than required into my work |
| Q44_3 | I make suggestions to improve ways of doing things at work |

*Source:* Cedefop.

([12]) 'I look for opportunities to learn new things' captures individual learning goal orientation. For reasons of questionnaire space, this item has been used only in the online (CAWI) questionnaire.

The OCB scale has reasonable statistical properties (Cronbach's alpha = 0.69). High values correspond to extensive OCB. To be able to display OCB effectively, workers must know the ins and outs of the operations at work, so they must have made the same type of asset-specific investment required for the development of work-related practical wisdom.

Workers' willingness to make a firm-specific investment in the workplace is affected by the relationship between the worker and the manager or supervisor (Martin et al., 2016). Three questionnaire items were used to determine a scale for the quality of the relationship with the management at work (Table 7).

Table 7. **Questionnaire items used for quality of the relationship with management**

| Item identifier | Regarding your manager or supervisor, to what extent are the following statements true? |
|---|---|
| Q40_2 | My manager treats me fairly [reversed] |
| Q40_1 | My manager or supervisor acts as if I would do as little work as possible if left alone |
| Q40_3 | My manager or supervisor treats me as if I were a machine or robot |

*Source:* Cedefop.

High values of the index denote a poor relationship with management (the first item was reverse-coded). The index has satisfactory statistical proprieties (Cronbach's alpha = 0.66).

The AMO model can also accommodate additional workplace-level variables that can facilitate or hinder work-related learning. The contextual characteristics included in the AMO model are:

(a) the availability of the information needed to do one's job well;
(b) the availability of other sources of knowledge;
(c) the integration of learning into the broad organisational practices;
(d) the goal orientation of the workplace.

The availability of information needed to do one's job well can facilitate skills development and it can increase the frequency of learning episodes.

The availability of other sources of knowledge is captured by two questionnaire items: the availability of suitable training opportunities and the availability of information about training opportunities tailored to worker needs.

The integration of learning into broad organisational practices is captured by one questionnaire item about the importance of learning for one's advancement. The assumption is that if learning is key for one's advancement, management must have the ability to recognise learning to reward it.

The goal orientation that prevails in the workplace (as perceived by the workers) can either encourage or discourage workplace learning. For example, an overly competitive performance goal orientation of the workplace that puts a premium on outperforming colleagues may undermine cooperation and discourage learning from one's mistakes (Theis & Bipp, 2020, van Dam, 2015).

These four contextual characteristics of the AMO model are captured by six questionnaire items (Table 8). The items are considered separately and are not collapsed into indexes or scales.

Table 8. **Additional contextual characteristics added to the AMO model**

| Item identifier | Item | Contextual characteristic |
|---|---|---|
| Q42_4 | All the information needed to master key aspects of my job is readily available | Information available |
| Q21_1 | [There is a] lack of training activities that are tailored to my needs | Sources of knowledge |
| Q21_2 | [There is a] lack of information on where to find suitable training activities | Sources of knowledge |
| Q23_2 | My progression at work also depends on learning new things for my work | Integration of learning |
| Q42_1 | Performance is compared between colleagues | Goal orientation |
| Q42_2 | Mistakes at work are not tolerated | Goal orientation |

*Source:* Cedefop.

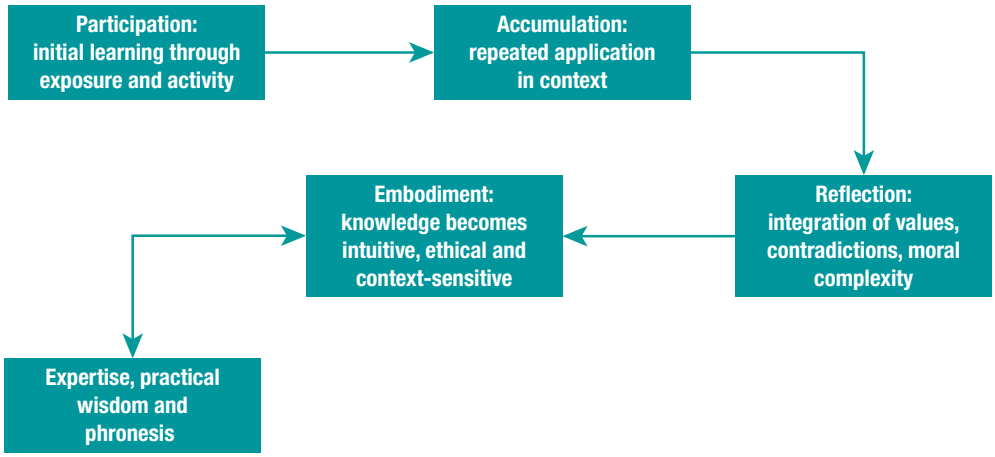
CHAPTER 4.

# Work-related learning and skills development

## 4.1. Skills development, expertise and practical wisdom

Time alone does not transform new knowledge into expertise; the knowledge gained from participation in learning activities becomes wisdom over a prolonged period of time, following reflective, emotionally invested practice. Some learning can be expected to take place soon after participation in learning activities. However, the process of knowledge transformation requires that tacit knowledge is acquired through socialisation and transmitted to others (the transformation from tacit to explicit knowledge). This knowledge can then be combined with other forms of explicit knowledge. Following the enrichment of this knowledge with personal experience and expertise, the resulting new knowledge becomes internalised and embodied as practice (Figure 9). This last phase is the most relevant to the development of expertise and phronesis (Nonaka & Hirotaka, 2019).

Figure 9. **Journey from skills acquisition to skills development**




*Source:* Cedefop.

## 4.2. Examining skills development drivers

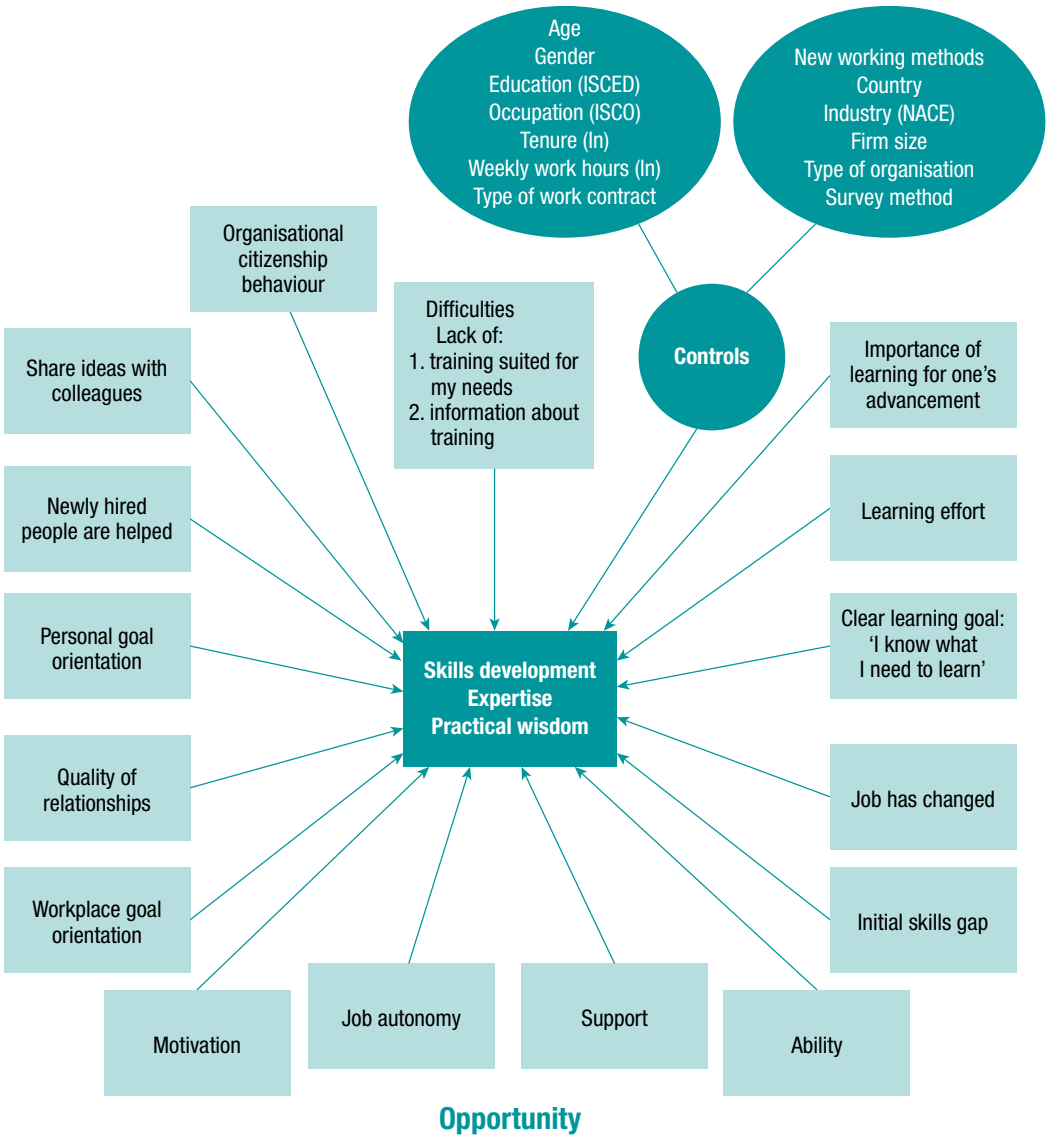
The AMO model and the other variables introduced in the previous chapter may enable or hinder the transformation process and the development of expertise and phronesis. The analysis in this section concerns the relationships between stable organisational and individual characteristics, on the one hand, and skills development, on the other.

The initial analysis has been carried out using the following linear regression model:

$$skills\ development_i = \beta X_i + \varepsilon_i$$

Skills development includes the four items described in Section 2.2. In this equation, X is a matrix containing the variables discussed in the previous chapters plus control variables; β is a vector of coefficients to be estimated; ε denotes the error term (assumed to be distributed according to a normal distribution N(μ,σ)) and the suffix i denotes individual observations ([13]). The structure of the model, with the main variables and controls, is summarised in Figure 10.

Figure 10. **Empirical model used to analyse skills development**




*NB:* Skills development is the dependent variable; the other boxes and ellipses detail the variables included as regressors. ISCED, International Standard Classification of Education; NACE, Statistical Classification of Economic Activities.

*Source:* Cedefop.

([13]) The scale of skills development is designed in such a way that it can only have positive values, and its values are constrained in the range from 1 to 4. While the peculiarities of the dependent variable render it less easily analysed with a standard linear regression model, a range of alternative models were tested and produced similar results. Therefore, the linear regression results are presented here. Further results can be obtained from Cedefop upon request.

The estimates of the regression model for the subset of variables that are directly relevant to this analysis are presented in Table 9 ([14]). Learning participation is approached in two ways.

(a) Model 1 includes among the explanatory variables the index of frequency in participation in learning activities.

(b) Model 2 includes among the explanatory variables the reported importance of participation in learning activities for one's learning. These questionnaire items were included only in the online (CAWI) version of the ETLS. The index derived from the importance of the learning activities for one's learning captures workers' ability to integrate information from many different sources.

Table 9. **Regression analysis of skills development**

| Variables | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ |
| Participation in learning activities | 0.192 | ** | 86.452 | — | | |
| | (0.013) | | | — | | |
| Importance of learning activities for one's learning | — | | | 0.222 | ** | 85.554 |
| | — | | | (0.016) | | |
| Ability to learn | 0.027 | ** | 32.386 | 0.022 | * | 8.925 |
| | (0.009) | | | (0.010) | | |
| Motivation to learn | 0.190 | | 90.540 | 0.165 | ** | 86.648 |
| | (0.009) | | | (0.011) | | |
| Support for learning | 0.048 | ** | 70.824 | 0.051 | ** | 68.755 |
| | (0.007) | | | (0.008) | | |
| Job autonomy | 0.049 | ** | 67.412 | 0.063 | ** | 77.613 |
| | (0.008) | | | (0.007) | | |
| Poor relationship with manager | -0.018 | * | 10.761 | – 0.013 | | |
| | (0.008) | | | (0.009) | | |
| Change to job tasks | 0.083 | ** | 85.563 | 0.091 | ** | 89.002 |
| | (0.006) | | | (0.005) | | |
| Lack of training activities tailored to my needs | 0.002 | | | – 0.006 | | |
| | (0.005) | | | (0.004) | | |
| Lack of information on where to find training | 0.007 | | | 0.002 | | |
| | (0.008) | | | (0.007) | | |

([14]) The full set of estimates can be found in Annex 2.

| Variables | Model 1 | | | Model 2 | | |
|---|---|---|---|---|---|---|
| | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ |
| Performance compared between colleagues | -0.018 | ** | 43.177 | – 0.019 | ** | 48.667 |
| | (0.005) | | | (0.005) | | |
| Mistakes at work not tolerated | 0.009 | | | 0.011 | | |
| | (0.006) | | | (0.005) | | |
| 'I share ideas about how to do the job with colleagues' | -0.001 | | | – 0.008 | * | 2.235 |
| | (0.004) | | | (0.004) | | |
| Ability of newly hired workers to rely on help from colleagues | 0.004 | | | 0.003 | | |
| | (0.011) | | | (0.012) | | |
| OCB | 0.014 | | | 0.030 | * | 20.667 |
| | (0.012) | | | (0.012) | | |
| 'I avoid new tasks if there is a risk of appearing incompetent to others' | -0.012 | ** | 50.527 | – 0.011 | ** | 27.983 |
| | (0.003) | | | (0.004) | | |
| 'I learn new things to demonstrate my abilities to others' | 0.031 | * | 22.027 | 0.037 | ** | 34.980 |
| | (0.012) | | | (0.012) | | |
| 'I know what I need to learn for my work' | 0.044 | ** | 54.580 | 0.037 | ** | 40.647 |
| | (0.010) | | | (0.011) | | |
| Career progression at work affected by learning | 0.016 | ** | 38.524 | 0.018 | * | 9.906 |
| | (0.005) | | | (0.008) | | |
| Ready availability in the workplace of information needed | 0.005 | | | 0.008 | * | 27.500 |
| | (0.004) | | | (0.003) | | |
| Need to develop your work-related skills | 0.205 | ** | 86.365 | 0.212 | ** | 87.764 |
| | (0.014) | | | (0.013) | | |
| Ability to cope with one's workload | 0.037 | ** | 61.713 | 0.043 | ** | 62.780 |
| | (0.007) | | | (0.008) | | |

* Significant at 5 %.
** Significant at 1 %.
‡ Measure of the size of the bias needed to render the coefficient non-significant.

*NB:* Data are weighted. Standard errors are presented in parentheses. The reference category of the variables is given in parentheses here: country (Austria), occupation ISCO 2 (commissioned armed forces officers), firm size (10 people or fewer), limitations because of chronic conditions (none), highest level of education attained (primary or no formal education), age (16 to 20 years of age), foreign status (country national), contract (permanent), sector (private), survey methodology (CATI).

*Source: Cedefop based on ETLS data.*

The analysis shows that the results can be grouped in three classes. The first class contains results that are in absolute size much larger than the rest and are very robust to bias.

Variables capturing sources of motivation and opportunities to grow and develop at work are strongly related to the development of skills and expertise. Workers who are exposed to more motivation drivers tend to experience larger changes in expertise than workers who are exposed to fewer drivers of motivation.

The analysis confirms that learning needs have a powerful influence on the development of skills and expertise. Employees whose job tasks changed during the year and those who at the beginning of the year acknowledged that they were under-skilled (i.e. had a skills gap or deficit) tend to experience more skills development (change in expertise) than workers whose jobs did not change or who were not under-skilled. This is consistent with previous research showing that under-skilling is a temporary phenomenon, which tends to be overcome and mostly turns into a situation of matched skills or, sometimes, over-skilling (Cedefop, 2015).

Finally, the learning effort, the index of participation in learning activities is strongly associated with skills development.

The second class of results contains results that are large and robust to bias.

Being able to cope with one's workload frees up resources that can be dedicated to learning and reflection: the variable measuring the ability to cope with the workload has a positive correlation with an increase in skills and expertise.

Opportunity is measured by the degree of job autonomy and support. Autonomy and support are clear workplace characteristics, and they are strongly and robustly linked to skills development.

Changes in job tasks create the need to develop new skills and is associated with skills development.

Having a clear learning goal – knowing what to learn – is also positively and robustly associated with skills development.

The third class of results consists of results that are relatively small and only weakly robust to bias.

Knowing that learning is important for career progression is positively associated with skills development. Knowing that learning is important for one's career may be considered a personal attitude influenced by workplace characteristics. It partly derives from seeing that learning is deemed important in the workplace and that managers are capable of assessing learning and relating it to career progression.

The ability to learn and a positive approach to a performance goal orientation, based on seeking proof of one's abilities, have a positive relationship with the development of expertise ( [15]). A personal goal orientation based on the avoidance of opportunities out of fear of appearing incompetent has a negative association with the development of expertise. These are personal characteristics that are associated with skills development.

A workplace in which managers adopt an overly competitive performance goal orientation, which compares performance among workers, has a negative association with the development of expertise. Comparison of performance may shift workers' focus to task execution and away from achieving learning goals. An emphasis on relative performance undermines trust between colleagues and decreases the social dimension of learning.

Finally, a bad relationship with managers or supervisors is associated to a smaller skills development.

Model 2, in which the importance of the learning activities replaces learning effort, provides a complementary perspective. It links the concept of learning importance to the development of expertise. This variable has a very strong relationship with skills development (development of expertise and practical wisdom). The regression coefficient on the index of importance of learning activities is 0.222 (with a standard error of 0.016), significantly different from zero. The finding is robust, as the omitted variable bias would have to account for 86 % of the estimated coefficient to overturn the inference.

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([15]) It may be argued that one's education is a better measure of one's ability to learn. Running the same regression model without education controls leaves the coefficient on ability unaltered. 'Ability', then, is a measure of the ability to learn unrelated to educational attainment. From a policy perspective, behavioural interventions aimed at improving the delay of gratification and confidence in one's ability to learn may influence the development of expertise.

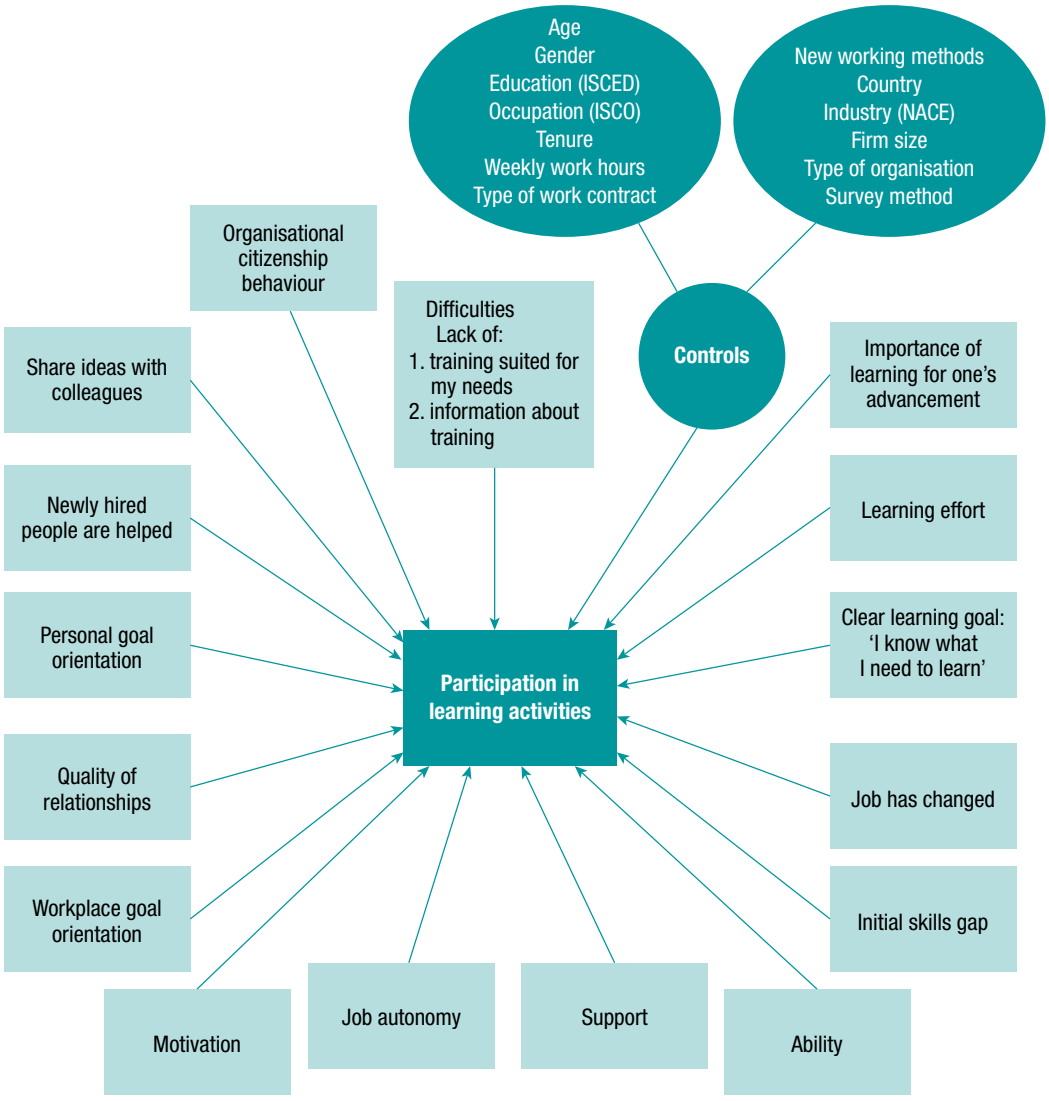
It is therefore safe to conclude that workers who consider a multitude of learning activities important see greater gains in their skills – more expertise – than workers who consider a limited number of learning activities important.

The analyses show that the development of expertise and practical wisdom, which is so important when workers are to contribute to the success of the organisation, is strongly influenced by contextual variables shaping and characterising workplaces.

## 4.3. Analysing participation in learning activities

This section presents regression analysis aimed at explaining the frequency of engagement in various learning activities (Figure 11). The first analysis looks at total participation in all learning activities. The second analysis investigates how workers differentially engage in employer-organised and self-initiated learning activities.

Figure 11. **Empirical model used in the analyses of the participation in learning activities**




*Source:* Cedefop.

Model 3 in Table 10 shows the results for key variables relevant to the analysis ([16]). Also in this case, three coefficients stands out as being particularly large: the motivation to learn, the need to develop work-relates skills and knowledge and the support for learning are all strongly and robustly associated with large skills development. All the relationships found are robust, in the sense that it would take an implausibly high amount of omitted variable bias to change the inference.

Participation in learning activities is more frequent for workers with job autonomy, who engage in OCB and share ideas with colleagues.. Changes and job tasks and

There is also a positive link between participating in learning activities and the availability of information on where to find training. If information about the training possibilities is not readily available, there is a need to participate in other learning activities.

Participation in learning activities increases among workers who avoid taking up new tasks lest they risk appearing incompetent (avoidance performance goal orientation). Possibly, these workers prepare for these perceived risky tasks through participation in learning activities. Similarly, workers who learn to demonstrate their abilities to colleagues and who share information with colleagues have a higher level of participation in learning activities than workers who do not. Finally, a workplace with a system in place that recognises the importance of learning for promotions encourages workers to engage more frequently in learning activities.

Demotivating workplace characteristics, such as difficult relationships with managers and supervisors, are still positively associated with participation in learning activities.

Table 10. **Regression analysis of participation in learning activities**

| Variables | Model 3: overall index of participation in learning activities | | | Model 4: index of participation in employer-organised training | | | Model 5: index of participation in self-initiated learning activities | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ |
| Ability to learn | -0.021 | ** | 42.888 | -0.071 | ** | 34.882 | -0.008 | | |
| | (0.006) | | | (0.023) | | | (0.009) | | |
| Motivation to learn | 0.265 | ** | 94.712 | 0.139 | ** | 84.173 | 0.296 | ** | 95.276 |
| | (0.007) | | | (0.011) | | | (0.007) | | |
| Support for learning | 0.204 | ** | 92.163 | 0.224 | ** | 84.821 | 0.199 | ** | 86.947 |
| | (0.008) | | | (0.017) | | | (0.013) | | |
| Job autonomy | 0.081 | ** | 82.616 | 0.059 | ** | 72.652 | 0.086 | ** | 83.737 |
| | (0.007) | | | (0.008) | | | (0.007) | | |
| Poor relationship with manager | 0.063 | ** | 64.818 | 0.105 | ** | 71.438 | 0.052 | ** | 57.706 |
| | (0.011) | | | (0.015) | | | (0.011) | | |
| Change to job tasks | 0.055 | ** | 89.006 | 0.084 | ** | 88.165 | 0.047 | ** | 82.998 |

([16]) The full set of results can be found in Annex 2.

| Variables | Model 3: overall index of participation in learning activities | | | Model 4: index of participation in employer-organised training | | | Model 5: index of participation in self-initiated learning activities | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ |
| | (0.003) | | | (0.005) | | | (0.004) | | |
| Lack of training activities tailored to my needs | 0.007 | | | -0.027 | ** | 48.503 | 0.015 | ** | 35.413 |
| | (0.004) | | | (0.007) | | | (0.005) | | |
| Lack of information on where to find training | 0.033 | ** | 70.074 | 0.011 | | | 0.040 | ** | 74.702 |
| | (0.005) | | | (0.009) | | | (0.005) | | |
| Performance compared between colleagues | 0.010 | ** | 23.265 | 0.037 | ** | 67.839 | 0.003 | | |
| | (0.004) | | | (0.006) | | | (0.004) | | |
| Mistakes at work not tolerated | 0.017 | ** | 28.660 | 0.036 | ** | 33.895 | 0.012 | * | 16.848 |
| | (0.006) | | | (0.012) | | | (0.005) | | |
| 'I share ideas about how to do the job with colleagues' | 0.038 | ** | 68.485 | 0.003 | | | 0.047 | ** | 70.047 |
| | (0.006) | | | (0.011) | | | (0.007) | | |
| Ability of newly hired workers to rely on help from colleagues | 0.008 | * | 23.475 | 0.023 | * | 6.281 | 0.004 | | |
| | (0.003) | | | (0.011) | | | (0.004) | | |
| OCB | 0.095 | ** | 81.014 | 0.018 | | | 0.114 | ** | 85.981 |
| | (0.009) | | | (0.015) | | | (0.008) | | |
| 'I avoid new tasks if there is a risk of appearing incompetent to others' | 0.021 | ** | 71.762 | 0.049 | ** | 63.218 | 0.014 | ** | 44.542 |
| | (0.003) | | | (0.009) | | | (0.004) | | |

| Variables | Model 3: overall index of participation in learning activities | | | Model 4: index of participation in employer-organised training | | | Model 5: index of participation in self-initiated learning activities | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ | Coefficient | | Percentage bias to nullify inference ‡ |
| 'I learn new things to demonstrate my abilities to others' | 0.026 | ** | 54.192 | 0.016 | | | 0.028 | ** | 50.763 |
| | (0.006) | | | (0.014) | | | (0.007) | | |
| 'I know what I need to learn for my work' | 0.003 | | | -0.034 | | | 0.012 | | |
| | (0.016) | | | (0.019) | | | (0.015) | | |
| Career progression at work affected by learning | 0.038 | ** | 58.025 | 0.054 | ** | 70.333 | 0.034 | ** | 47.466 |
| | (0.008) | | | (0.008) | | | (0.009) | | |
| Ready availability in the workplace of information needed | 0.016 | * | 27.149 | 0.100 | ** | 71.866 | -0.004 | | |
| | (0.006) | | | (0.014) | | | (0.005) | | |
| Need to develop your work-related knowledge and skills, as of one year ago | 0.134 | ** | 85.117 | 0.139 | ** | 85.588 | 0.133 | ** | 83.485 |
| | (0.010) | | | (0.010) | | | (0.011) | | |
| Ability to cope with one's workload | 0.019 | ** | 28.200 | 0.073 | ** | 67.036 | 0.006 | | |
| | (0.007) | | | (0.012) | | | (0.007) | | |

* Significant at 5 %.
** Significant at 1 %.
‡ Measure of the size of the bias needed to render the coefficient non-significant.

*NB:* Data are weighted. Standard errors are presented in parentheses. The reference category of the variables is given in parentheses here: country (Austria), occupation ISCO 2 (commissioned armed forces officers), firm size (10 people or fewer), limitations because of chronic conditions (none), highest level of education attained (primary or no formal education), age (16 to 20 years of age), foreign status (country national), contract (permanent), sector (private), survey methodology (CATI).

*Source:* Cedefop based on ETLS data.

The second analysis distinguishes between participation in employer-organised learning activities (on- and off-the-job training) and participation in self-initiated learning activities. It is plausible to assume that the variables associated with participation in employer-organised activities differ from the variables associated with participation in self-initiated learning activities.

Model 4 in Table 10 presents the results for participation in employer-organised learning activities (off-the-job and on-the-job training), and model 5 presents the results for participation in self-initiated learning activities (using books and manuals, self-initiated training, learning while working, trial and error, thinking about how to improve, observing colleagues and asking for help from more experienced colleagues and supervisors).

The drivers of employer-organised training are very similar to those driving self-initiated learning. Motivation, support for learning, and the need to acquire new knowledge and skills are the factors with the strongest association with the frequency of participation in both employer organised and employee self-initiated learning activities. Next in order of the strength of the positive association with the frequency of participation in employer-organised and self-initiated learning activities are: job design features (job autonomy, change in job tasks, learning is important for career development), avoid taking up new tasks lest they risk appearing incompetent (avoidance performance goal orientation), a poor relationship with manager and supervisor, and strict managerial practices not tolerating mistakes at work.

For employer-organised learning activities, ability to cope with one's workload and performance comparison among colleagues have aa positive relationship with participation. Workers in organisations that make information on how to do one's job readily available also tend to participate in employer-organised training. Ability to learn is associated with a selective participation in employer-organised learning activities. The introduction of new technologies and equipment, of new ways of working, and of new or improved products and services (see Annex 2) are also accompanied more employer-organised learning. This is a clear sign that employers take control of the skills formation process in changing circumstances. When employers hire workers with some skills gaps and when they implement changes in job design, it is in the employers' interest to provide training that ensures that workers have the skills needed to do their jobs well. These findings suggest that, in organisations, the provision of organisation-sponsored training goes hand in hand with other desirable workplace features. This finding is consistent with the results of analyses based on the 2019 European Company Survey, which showed that workplaces that value skills utilisation tend to provide more training and have a lower rate of worker turnover (Russo, 2024).A lack of availability of suitable training options is associated with lower participation in employer-organised training and with an increased participation in self-initiated learn activities. Similarly, the lack of information on where to find training courses is associated with an increase in participation in self-initiated learning activities. These two findings suggest that workers may increase their participation in self-initiated learning to make up for an unmet want of training opportunities organised by employers.

Other features that are associated to participation in self-initiated learning activites but not with participation in employer-organised learning activities are: the performance of organisational citizenship behaviour, sharing information with colleagues, and a performance-approach goal orientation (learn to demonstrate their abilities to colleagues).

The results of the analyses of the frequency of participation in learning activities are somewhat sobering. The naive assumption that learning activities are complements, so that the increase in the participation in one activity is accompanied by an increase in participation in all other activities, is upheld by the data. Many variables are associated with a higher level of participation in all learning activities.

CHAPTER 5.

# Conclusions and policy pointers

## 5.1. Introduction

This report has described the relationship between the development of expertise and workers' engagement in learning activities at and for work and analysed it using Cedefop's ETLS data. The ETLS makes it possible to examine in detail how workers develop expertise and to unravel the links between workplace context and participation in learning activities.

The ETLS has several distinctive features that set it apart from other surveys with a skills, training or learning component. First, it introduces a measure of learning that maps the process of the development of expertise. The learning measure has features capturing the development of praxis (the ability to do things right) but also considers the moral element of phronesis (the ability to do the right thing). This conception of learning is particularly relevant to employees who are empowered to solve work-related problems and to make autonomous decisions. It involves the mastery of skills and knowledge, but it also assumes solid understanding of the context and the interests of various stakeholders.

The ETLS examines the development of expertise and practical wisdom comprehensively by focusing on workers active in different occupations and sectors. It investigates workers' skills development in the context of the workplace. This is the main value added of the ETLS compared with earlier studies on the development of the expertise of chess players, sports professionals and other niche activities. By expanding the scope to all workers, the ETLS stimulates progress in creating a general approach to expertise development that can be applied to workers and people in general. The development of expertise and practical wisdom acts as a proxy for skills development, which is understood through survey items capturing workers' self-reported improvements in different aspects of their job.

## 5.2. Analysis approach and core findings

The analysis is based on an augmented AMO model. It is based on the notion that skills development is influenced by the ability to learn, learning motivation and the opportunities to learn. The empirical analyses show that workers with clear learning goals and confidence in their ability to attain their learning goals (the 'ability' part of the AMO model) tend to experience more expertise development.

Motivation (the 'M' part of the AMO model) is strongly (positively) associated with skills development. However, motivation must not be considered a purely personal characteristic. It has an intrinsic component – made up of personal interests and congruence between personal and workplace values – but it is also regulated by external incentives. Motivation is the result of the interplay between personal and workplace characteristics. Job autonomy and support for learning (the 'opportunity' part of the AMO model) are positively related to the development of expertise in the workplace.

While ability is mainly a personal construct, motivation captures personal characteristics and responses to contextual features. Opportunity predominantly captures workplace characteristics. These are clear indications that workers' responses to their workplace environments are associated with skills development. This result is also confirmed by the analysis of variables augmenting the core AMO model.

For example, workers that are supported by management in their learning, and who can cope with their workload, tend to experience skills development. Similarly, workers who perceive that learning is important for their career progression tend to experience more skills development. Finally, an overly competitive work environment, where performance is compared between colleagues, is negatively

associated with skills development.

The analysis also shows that a prior need for skills development is associated with actual skills development. Under-skilled workers and workers confronted with changing job design tend to experience higher levels of skills development.

The analysis also examines the relationship between participation in learning activities and skills development. The frequency of participation in learning activities during the year is strongly related related to the degree of skills development during the same period. Participation in learning activities is fundamental, but it is a conservative estimate because it does not takes in consideration how current knowledge support the development of knowledge and skills over time. Longitudinal data that measure skills development over a longer time period would enable better understanding of how and to what extent learning measured in a given year influences skills development later on. In addition, workers' ability to learn from multiple learning activities is positively associated with expertise development.

## 5.3. Personal and workplace features and learning

The results from the augmented AMO model analysis explaining the frequency of participation in learning activities show that some personal and workplace features are associated with lower levels of participation in training.

Support for learning and the perceived importance of learning for advancement are associated with more participation in learning activities.

Participation in employer-organised training and in self-initiated learning activities respond to a common set of variables. This suggests that they may not be complements. From the analysis of participation in employer-organised learning, it is obvious that employers take control of skills development in changing work environments. Changes in job design, the adoption of new technologies, the introduction of new product and services, and the adoption of new working methods go together with higher participation in employer-organised training. Employers take responsibility for the skills they need when they introduce innovation, or implement changes in operations, and when jobs or tasks are redesigned. This is also reflected in the positive association between managerial support for learning and participation in employer-sponsored training, and in the link between participation in such training and the perceived importance of learning for promotion.

Participation in self-initiated learning is the result of the interaction between personal and workplace characteristics. Contextual factors are important. A lack of available information about training opportunities and the lack of suitable training are associated with more frequent participation in voluntary learning activities. This suggests that employer-organised training and self-initiated learning may be substitutes. Restrictive learning environments translate into less employer-sponsored training. A lack of training opportunities that can cater to employees' need is positively associated with participation in self-initiated learning, suggesting that workers try to compensate for the scarcity of learning opportunities.

The performance of organisational citizenship behaviour and the perception that learning is regarded as an important aspect in career progression is associated with an increased participation in voluntary learning activities.

## 5.4. Limitations

The ETLS is a cross-sectional survey. Therefore, the estimated coefficients are potentially biased (omitted variable bias) and the results are best characterised as associations (correlations) rather than causal effects. However, the choice of the linear specification of the AMO model made it possible to measure the stability of the results. Many of the results presented in the report are robust to the omitted variable

bias, in the sense that it would take an implausibly large bias to nullify the influence and change the sign of the correlation.

Another ETLS limitation relates to the need to keep the survey length to a manageable size. The pragmatic choice was made to rely on an extensive measure of participation in learning activities: the frequency of engagement in various learning activities. It was not possible to consider learning intensity measures such the duration (in hours or days) of participation in learning. For the same reason, the ETLS did not include questions probing respondents' perception of the quality of different learning activities.

## 5.5. Policy pointers

(a) The analyses of the ETLS data presented in this report point towards the following policy implications. Managers understand the vital importance of learning, especially in conjunction of the introduction of new technology and changes in job design. In these cases, it is clear that learning is important if workers need to be able to operate in the new environment. The analyses show that employers control the skills formation process when gaps need to be bridged. The frequency of participation in employer-sponsored training is high for under-skilled workers and for workers who experienced a change in their tasks at work.

(b) Fostering a learning culture that values the importance of learning for organisational success could effectively support work-related learning beyond learning for changes in technology and job design. A learning culture implies the deployment of practices that support learning (the provision of employer-sponsored training but also, for example, norms concerning learning at work). A learning culture also includes practices that induce workers to draw on their skills in the interest of the organisation. In this way, the learning culture ensures that learning creates value for the organisation, linking learning to business performance ([17]).

(c) Learning cultures may be particularly effective in sustaining learning for work. Learning is difficult to observe. It may be difficult for managers to gauge the development of their workers and to readily assess the importance of human capital for the success of their organisation. Managers may be able to observe their workers' participation in learning activities, especially employer-sponsored ones. It may be more difficult for managers to assess workers' participation in voluntary learning activities.

(d) Learning cultures are also effective in encouraging learning in the workplace because managers also often face difficulties in estimating the returns to investments in human capital. In fact, there is no easy way to predict when the participation in learning activities will reinforce expertise and practical wisdom. It is therefore difficult to link training costs to the outcomes in terms of skills development. When cost–benefit calculations are difficult, considering expenditures on learning and development as an investment may be challenging.

(e) Motivation is strongly associated with skills development. The ETLS shows that motivation should not be considered merely a personal characteristic of workers (intrinsic motivation). Motivation is also regulated by external, extrinsic, factors, such as pay and prevailing workplace norms. This implies that, if workers do not have the motivation to take up training, it is also because the context in which they operate is not delivering the right incentives. Policy and its implementation should pay closer attention to the relationship between employer-sponsored and voluntary learning activities. The ETLS analysis suggests that, when workers lack access to suitable employer-sponsored training opportunities, they engage in voluntary learning activities. This implies that participation in employer-provided, formal and on-the-job training only provides a partial image. Whether or not voluntary learning fully compensates for the lack of training is not clear.

(f) When employer-sponsored and voluntary learning are not independent, training subsidies for employer-sponsored training may crowd out some voluntary learning activities. This can lead to overestimated

17 An example of a policy that works in this direction is the stimulating learning culture in SMEs (SLIM) subsidy in the Netherlands.

expected benefits from such subsidies. If training subsidies are used by organisations that would have trained anyway, deadweight losses would occur. It is not clear that this is always the case, because difficulties in calculating a return on the investment in learning discourages training provision, and subsidies are beneficial.

Industry 5.0 is predicated on the concept of human-centricity, which in a workplace setting means directing technological innovation towards workers' empowerment. All forms of worker empowerment should be accompanied by the development of expertise. This includes praxis (the ability to do things right), but also phronesis (the ability to do the right thing). This is because empowerment brings along with it responsibility. Empowered workers must face complex work-related problems, and in their responses consider the needs and interests of multiple stakeholders.

The analyses in this report have underlined the important role of workplaces and workers in supporting Industry 5.0. Alongside expanding worker capabilities and empowerment, workplaces support learning by providing learning opportunities and by putting in place the set of requirements and inducements that support learning and the deployment of worker skills in the interest of organisations.

# Abbreviations

| | |
|---|---|
| AMO | ability, motivation and opportunity |
| CATI | computer-assisted telephone interviewing |
| CAWI | computer-assisted web interviewing |
| ETLS | European Training and Learning Survey |
| ISCO | International Standard Classification of Occupations |
| OCB | organisational citizenship behaviour |
| SMEs | small and medium-sized enterprises |
| VUCA | volatile, uncertain, complex and ambiguous |

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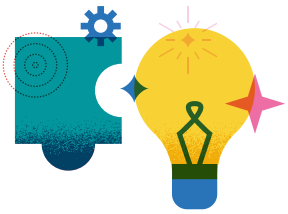

# Beyond skills development: unleashing human potential

## First findings from Cedefop's European Training and Learning Survey

This report makes a contribution towards better understanding human-centricity in the workplace. It reviews learning in an Industry 5.0 context and reports the first findings of the European Training and Learning Survey (ETLS).

The ETLS interviewed workers in the EU, Iceland and Norway to assess the development of various aspects of the workers' training, learning and ability to do their jobs. The analyses in this report underline the important role of workplaces and workers in supporting Industry 5.0.

Alongside expanding worker capabilities and fostering worker empowerment, workplaces support learning by providing learning opportunities and by putting in place the requirements and inducements that encourage learning and drive the deployment of worker skills for the advancement of work organisations.

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