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1. Skill Mismatch and shortages: the development of a EUniWell portfolio for well being improvement

1.1 Introduction

This deliverable focuses on providing a useful conceptual map to address skills shortages present in our EUniWell curricula and proposing a skill portfolio transversally useful to students, researchers and staff. We believe that the identified skills play a crucial role in different jobs, disciplines, and research areas. A specific focus is dedicated to the skills for researchers, who represent a category that very often acts as a bridge between academia and labour market.

In particular, we describe the skill portfolios which should be prioritized to form the students and the researchers of the future. We propose the set of skills that we believe to foster the enrichment of the competencies of university research and labour market accessibility.

However, it is paramount to stress the fact that the objective of universities should not be just the creation of future workers. The main goal should be to give citizens a method and the right tools to understand the complexity in which we live, our rights and duties in order to be able to form a more conscious society, capable of feeling European not only in terms of economic relations, but in terms of shared values and culture.

Having a “method” helps to update the skills and be flexible enough to quickly adjust to new environments. Cultivating and investing in diverse talent can, furthermore, unleash innovation, economic growth, and community well-being.

The report is organized as follows: in Section 1, we contextualize the particular historical period we are living in, highlighting the problem of skills shortages and its impact on well-being; in Section 2, we provide a brief overview of the European situation; Section 3 discusses skill shortages detected in the labour markets of the EUniWell countries; Section 4 describes the skills portfolio; in Section 5, the skills which need to be prioritized for young researchers are highlighted in further detail; Section 6 presents an overview of the proposed courses and microcredentials to update the training and make it more flexible and adaptable to the rapidly changing society in order to improve well being. The Appendices contain a detailed literature review, the definition and measurement of skill mismatch; and a brief overview of the University of Murcia, a new member of the EUniWell consortium.

1.2 Setting the stage

For around twenty years, between the mid-80s and the start of the Great Financial Crisis, the world has assisted to an acceleration of interconnection and interdependence of goods, services, capital, ideas and people. Globalisation, perceived by many as irreversible, has been a distinctive aspect of our economies, cultures, and societies; the Millennium Development Goals (MDGs), set up by the United Nations in 2000 for 2015 seemed at reach: millions of people were pushed out of poverty at world level, inequality between countries decreased and people’s well being increased.

However, after the financial crisis of 2008-2009 people started highlighting an increase of inequality within countries and the fact that the world economy was setting on a path of “slowbalisation”, with trade increasing less than world Gross Domestic Product (GDP). But it was in December 2019, that the outbreak of the Covid-19 pandemic gave us a taste of what a setback in this speedup of movements and exchanges might mean for our everyday life and well being. After less than three years, Russia invaded Ukraine, bringing warfare back to Europe.

Thus the world faced a rapidly changing economic and social environment, the dramatic consequences of the pandemic and global warming, as well as our dismay for the ongoing Ukrainian war. This background forced us to rethink our priorities, and focus our research much more on health, the environment¹ and the potential fragility of our democracies². Uncertainty and restlessness about the future impose a rethinking of our societies, our relationships with the environment and the world labour market. Political agendas can no longer be postponed - not only nationally but internationally. **Only a collective, shared, long-term vision can enable us to achieve sustainable, growth-oriented development directed toward the pursuit of well-being.**

In 2015, the United Nations had set the new priorities that each national and international community should pursue to achieve a more equitable and sustainable society: the Sustainable Development Goals (SDGs). The Goals were identified as universal objectives to reduce poverty, inequality, protect the environment and “ensure that by 2030 all people enjoy peace and prosperity”³. Seven years on, progress have been made, but with the pandemic, drought and flooding, the war as well as political considerations such as Brexit and the US China trade war, we have been moving away from reaching some of these objectives.

To prevent SDGs from being seen as just a list of good intentions, institutions, universities, research centres and governments should invest resources and time to study how to put them in practice in every context. We have to fight the climate crisis, ensure that no one goes hungry, there are no human rights abuses nor extreme poverty and that the population is healthy.

The European University for Well-Being, EUniWell, has distinguished itself among European University Alliances in contributing extensively to research on the high priority areas, identified by the SDGs as crucial for well being. By encouraging academic exchange and long-term partnerships across disciplines and partners, we want to build common ground for future research projects that have the potential to push well-being research forward. To this aim we are offering a set of tools to facilitate collaboration between academics, be it in education, in research or in engaging with society.

The starting idea was that “Europeans enjoy some of the longest life expectancies and Europe has one of the highest levels of human development in the world. Yet the long-term well-being of our youth is “endangered by challenges such as climate change, new diseases, rising populism, a growing divide between different groups in society, and – most sadly – the horrors of war in our

¹ Research has focused on abatement technologies, but abatement efforts are costly, requiring the large-scale diversion of capital and labour away from conventional economic activities

² The research Arenas of EUniWell reflect these topics: health, environment and sustainable cities, individual and social well being with the 4th Arena being on Teacher education, i.e. on how to convey suggestions to University curricula and how to train teachers and professors

³[https://www.undp.org/sustainable-developmentgoals#:~:text=The%20Sustainable%20Development%20Goals%20\(SDGs\)%2C%20also%20known%20as%20the%20people%20enjoy%20peace%20and%20prosperity](https://www.undp.org/sustainable-developmentgoals#:~:text=The%20Sustainable%20Development%20Goals%20(SDGs)%2C%20also%20known%20as%20the%20people%20enjoy%20peace%20and%20prosperity)

closest vicinity. Solving this paradox will require a holistic approach in which institutions of higher education, research and innovation have a leading role to play”⁴ (The first step to solve this paradox is to undertake research these areas. In the last 10 years, the Partner universities in EuniWell have increased their focus on SDGs, and accordingly publications in the area also risen from a baseline of just over 20% of publications on SDGs in 2010 to the current 30%. Linnaeus University, in particular, has achieved remarkable results in this timespan, going from 30 to 40% of SDGs-themed publications, followed by Florence and Nantes, which have increased significantly their interest in building expertise in these fields. More importantly, the EUniWell list of publications clearly demonstrates the leading role given to the topic of well-being, in terms of both volume of publications and specialisation (see Figure 1 where selected SDGs, the most linked to the EUniWell mission, are shown).

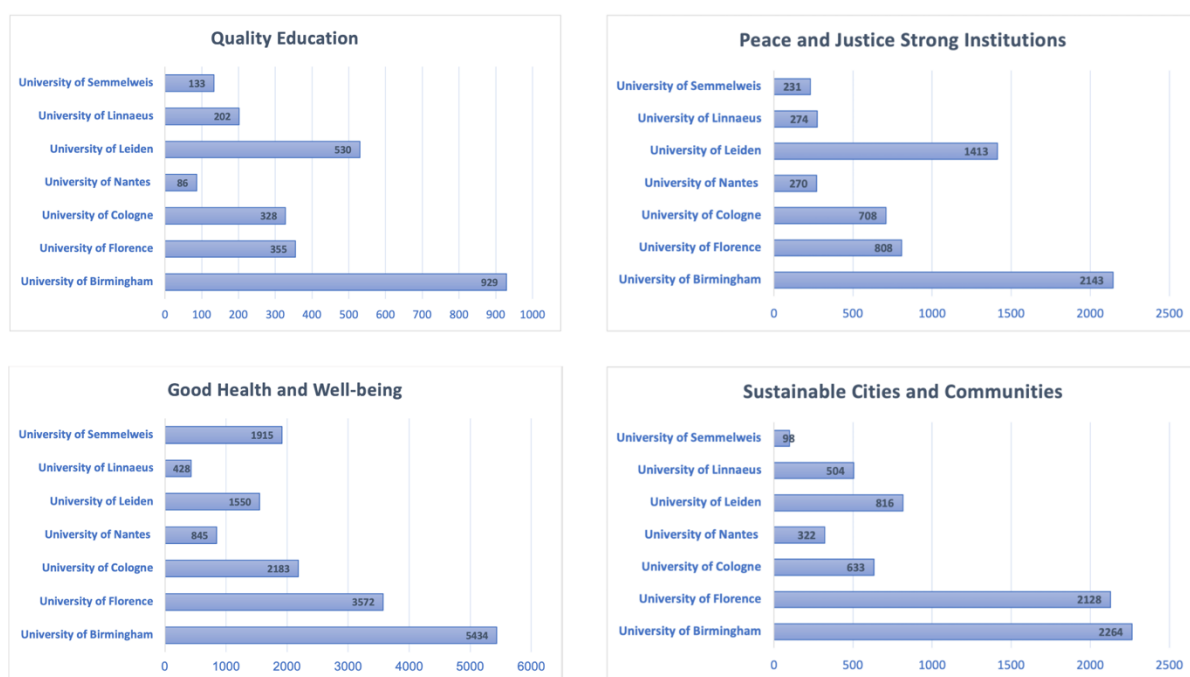


Figure 1 Publications for SDGs

1.3 Well being as a compass

Well-being is a multi-faceted concept that has been integrated in EUniWell’s vision as the compass with which to approach and boost cutting-edge research. Indeed, it is not only an objective *per se*, but also a lens through which different phenomena can be observed and studied. Well-being offers us a new way to measure progress, beyond GDP and with humane, societal and sustainable developments at the centre.

In this particular deliverable, we focus on the role that EUniWell partner universities can play in achieving these different dimensions of well-being, but with emphasis on a very important but still under researched dimension: how specific is the training provided by the universities and how satisfied are students/researchers for their job outcomes as well as for their training. Furthermore,

⁴ <https://www.euniwell.eu/about/our-alliance>

it is also crucial to monitor wellbeing at work, since according to several recent studies, it makes companies significantly more attractive to jobseekers.

In what follows, we assess a portfolio of competencies and skills, which should be prioritized in our curricula and research fields, in order to increase the well being and bridge the gap between the skills sought by employers and the skills that students and young researchers are equipped with at the end of their academic pathway.

The current situation is characterized by skill shortages as well as “skill mismatch”, i.e. a situation in which “education and training are not providing the skills demanded in the labour market, or that the economy does not create jobs that correspond to the skills of individuals”.⁵

Skill mismatch and skill shortages are crucial drivers in undermining well-being at the individual and societal level. A job consistent with one's aptitude, interests, and educational background will be more fulfilling than a job for which one turns out to be over- or under-qualified. Obtaining the right knowledge and skills, then, turns out to be crucial in order to be hired in the right position and at the same time in making the work environment a stimulating and efficient place.

Skills shortages are used in what follows as the barometer to individuate discrepancies between educational curricula and skills required by the labour market, at the national and regional level in EUniwell countries. Lack of adequate skills may compromise the professional perspectives of students and researchers, contributing to dissatisfaction and frustration.

⁵ https://www.ilo.org/skills/Whatsnew/WCMS_740388/lang--en/index.htm

1.4 Job satisfaction and well being

Knowing how satisfied alumni and researchers are with their occupation is a fundamental parameter in determining their life satisfaction, attitude towards the future and level of optimism.

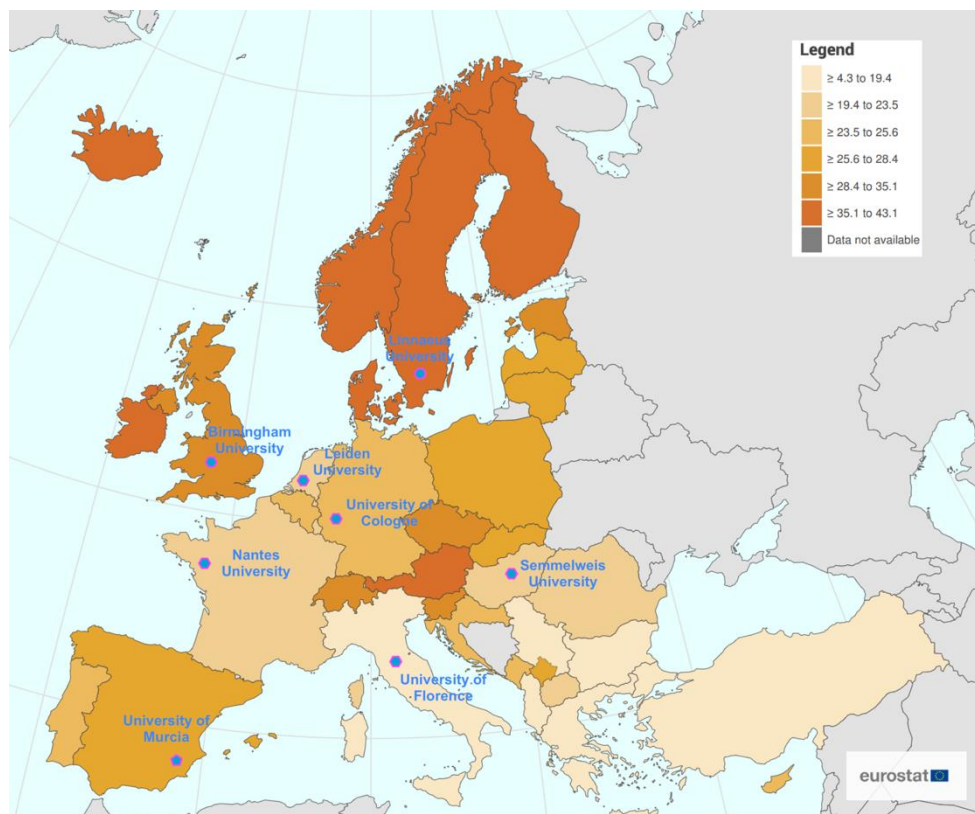


Figure 2: Job Satisfaction from Eurostat. Percentage of the EU-28 population, older than 16 years old, rating their job satisfaction as high, medium or low

The Eurofund research on the living and working conditions in Europe is particularly alarming, showing that in 2018 - before the Covid-19 pandemic and the Ukrainian war - more than half of Europeans thought that the “lives of today’s children would be more difficult than their own and that they thought that things were going in the wrong direction in EU”, according to the Eurobarometer survey on the Future of Europe.⁶ Though masking regional heterogeneity, Figure 2 shows how job satisfaction is low especially in Italy, France, Hungary and the Netherlands (where the University of Florence, Nantes, Semmelweis and Leiden are located). Only in Germany, Spain and the United Kingdom (where the Universities of Cologne, Murcia and Birmingham are situated) the satisfaction appears high, especially for the latter. Although these data⁷ are not sufficiently

⁶ https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef22029en.pdf

⁷ This data shows the percentage of the EU-28 population, older than 16 years old, rating their job satisfaction as high, medium or low by domain, sex, age and educational attainment level (in accordance with the AII ISCED 2011 level) statistical value for each region. https://ec.europa.eu/eurostat/databrowser/view/ilc_pw05/default/map?lang=en.

disaggregated to draw conclusions for the areas in which the EUniWell universities are located, they are alarm bells that should not be underestimated.

In the recent years, the structural transformation process, the global financial crisis of 2008-2009, the Covid 19 pandemic, and the Ukraine war have dramatically triggered a profound, deep and unexpected transformation of labour markets. We need to assess whether EUniWell partner Universities have been able to adjust rapidly enough to this transformation.

Digitalisation of technologies, automation processes as well as the entry of new professional figures on the market have experienced a rapid increase. As a consequence, tech employers often say they cannot find qualified talent for tech jobs locally, so they recruit nationally and globally, or poach workers from competitors. Indeed, lack of what are now considered essential skills is detected as one of the main crucial impediments by business to corporate investments, with negative effects on their labour productivity and their ability to innovate and acquire technological upgrading (Brunello and Wruuck 2019).

ManpowerGroup (2018) reports that talent shortages have never been more significant as in the

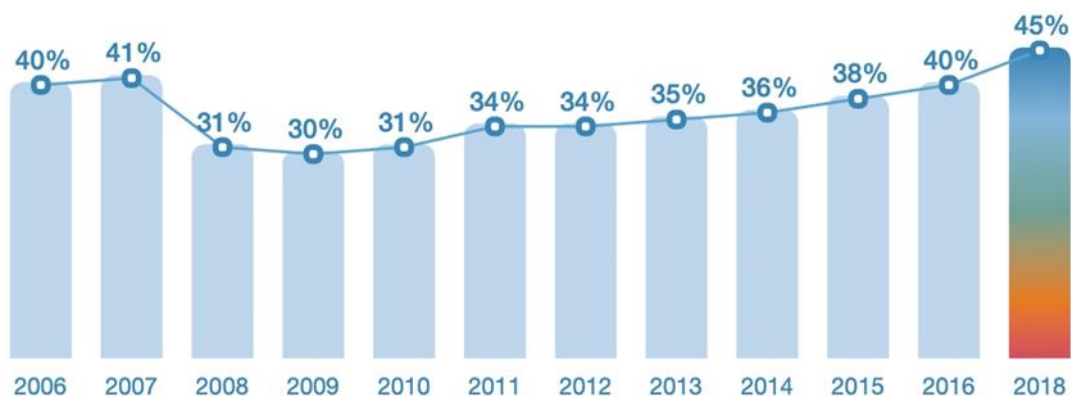


Figure 3 Global Talent Shortages reach 12-year high

recent years (Figure 3⁸). Indeed, their results depict an alarming situation in which employers face a hard time filling positions, citing a lack of experience (20%), a lack of essential hard (19%) and soft skills (8%) as the main causes.

Skill mismatch has thus become a hot topic for both economic and social development to the point of having been considered a priority to be included in the 2030 Agenda for Sustainable Development (United Nations 2015) and among the objectives of the Sustainable Development Goals (SDGs).

The recent statistics provided by LinkedIn and the World Economic Forum call for an urgent and drastic “reskilling revolution” (World Economic Forum, 2020; LinkedIn, 2022). Indeed, it has been reported that by 2027 the skill sets for jobs is expected to change by more than 50% and that by 2030 more than 1 billion people should need to be trained to cope with new sets of skills and competences (Figure 4⁹).

⁸ ManpowerGroup (2018) <https://cupdf.com/document/solving-the-talent-shortage-manpowergroup-2018-09-17-solving-the-talent-shortage.html?page=1>

⁹ <https://linkedin.github.io/future-of-skills/#explore>

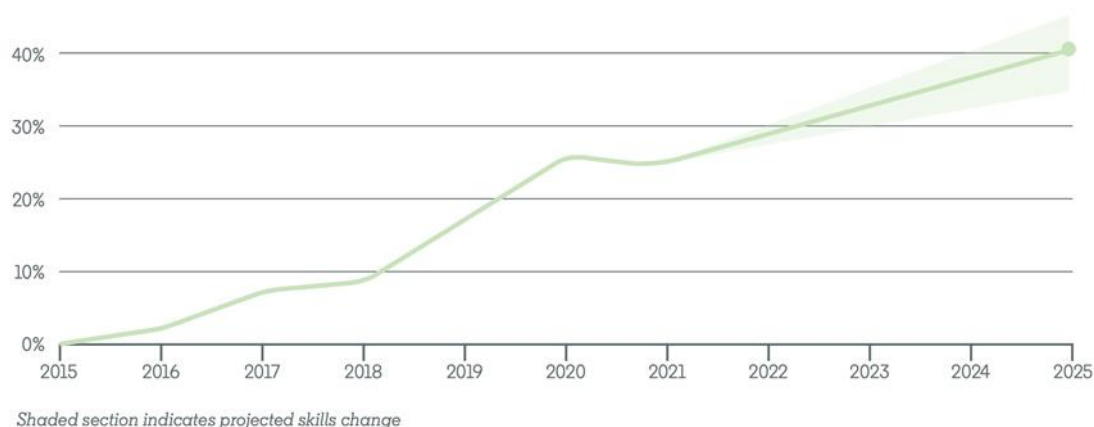


Figure 4 Skills are Changing, percentage change in members' skills globally)

Jobs requirements are changing at a significant rate and this acceleration has picked up considerably since the onset of the Covid-19 pandemic. It has been detected that digital and technological transformations have impacted every sector in the economy worldwide, favouring the emergence of new professions¹⁰. However, this process was already taking place. Indeed, the predictions of the World Economic Forum even before the Covid-19 pandemic and the war, forecasted an increased demand for high-growth professions, in particular workers in Data and AI, Engineering, Cloud Computing, but also workers in Marketing and sales (Figure 5, 6¹¹).

Professional Cluster	Number of opportunities (per 10,000)	
	2020	2022
figures extrapolated from data for 20 economies (LinkedIn)		
Data and AI	78	123
Engineering and Cloud Computing	60	91
People and Culture	47	58
Product Development	32	44
Sales, Marketing and Content	87	125
figures extrapolated from data for the United States (Burning Glass)		
Care Economy	193	260
Green Economy	9	14
ALL CLUSTERS	506	715

Figure 5 Emergence of clusters of professions of the future, 2020-2022

¹⁰ Many have been mentioned in the recent literature, spanning from Chief productivity officer to excess capacity broker, from drone manager to online teacher, from medical mentor to self-driving car mechanic etc.

¹¹ World Economic Forum (2020) https://www3.weforum.org/docs/WEF_Jobs_of_Tomorrow_2020.pdf

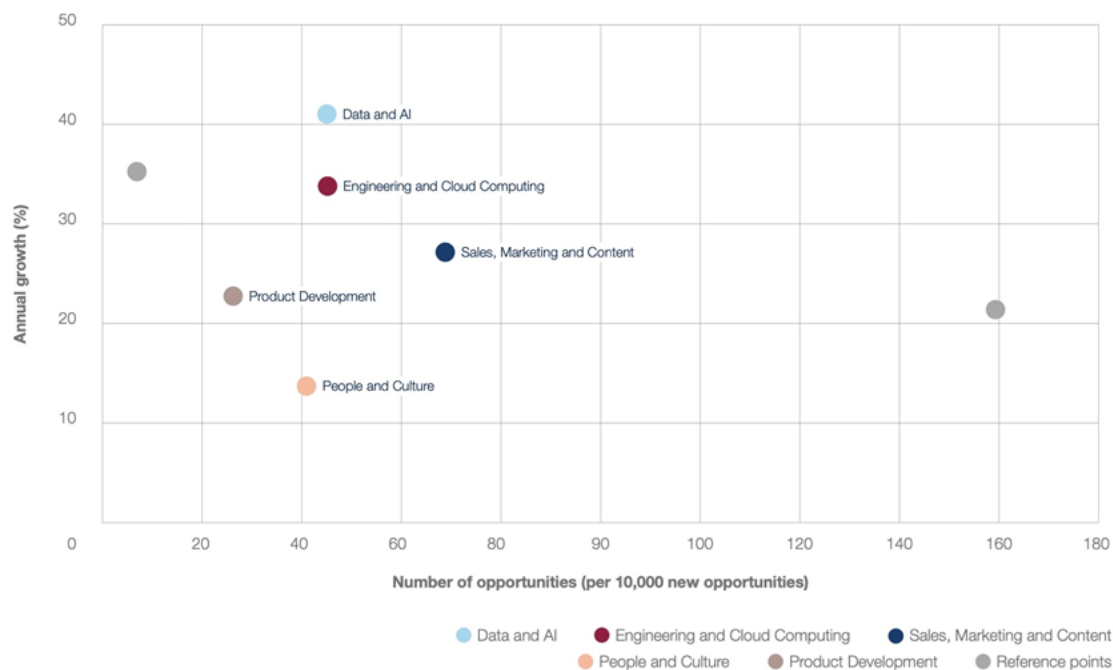


Figure 6 Emergence of clusters of professions of the future, 2020-2022

The presence of skill shortages and skill obsolescence in the labour market is not a recent phenomenon and has been widely studied in the literature¹². We can say that researchers agree that skill mismatch is a very broad concept that incorporates a variety of different notions, which necessitate specific definitions and measurements¹³.

In what follows we shall focus on the role played by EUniWell partner universities and the actions that can be put in place to bridge the gaps that occur between labour supply and demand at local and national level to increase students/staff/researchers' well being. Specifically, we propose to analyse the contribution that EUniWell can give to this topic and the leading role it can take in promoting adjustments between traditional and new jobs' perspective and the creation of the future most required skills.

¹² The problem of unemployment due to the misuse of skills appears for the first time at the 9th and 11th International Conference of Labour Statisticians (ICLS) (ILO 1957, 1966), categorising the problem under the generic term of “disguised underemployment”, without a proper definition of the phenomenon and its characteristics. Since the late 1970s economists and sociologists have identified in the “overeducation”, “occupational mismatch” and “over training”, situations in which the level or the kind of workers’ skills were not adequate in view of the particular job requirements (Halaby 1994; Sala et al. 2011). It is certainly because of the cutting-edge work done by Freeman (1976), with the notion of “overeducation”, that this topic has taken particular ground and sparked debates and heated discussions to the present day. Since that initial notion, great efforts have been made to better define the concept of skill mismatch, and to better decipher its causes and potential consequences in terms of social and economic costs. The term mismatch has been often used in economics to adapt it into all the situations in which there stands an imbalance between labour demand and supply, due to an asymmetry of skills of qualification levels (Kriechel and Vetter 2019). At the 16th ICLS conference (ILO 1998), the problem to define and measure skill misuse was discussed and different indicators were considered to calculate the inadequate employment due to the underutilisation of skills and abilities.

¹³ Being skills and the accumulation of human capital strategic resources to drive the economy to growth (Romer 1989), understanding skill mismatch dynamics is fundamental, since only a well-balanced labour market can ensure a solid and reliable increase in productivity, growth, but also a more equitable and more satisfied society in the long run.

As widely recognized, Universities have an important responsibility in providing the most high-quality and updated curricula. In what follows, we shed light on which courses should be developed, also relying on MOOC, microcredentials and short thematic courses, based on frontier research.

2. EUniWell countries job market situation and its impacts on well being

Skill mismatch and skill shortages are not a static phenomenon, and several factors may contribute to skill mismatch dynamics. Indeed, as highlighted by Mauriès (2016), an individual that is mismatched in a certain year (or month), may be well matched in a later one, if appropriate targeted policies are made in action. Having a responsive system which supports the acquisition of cutting-edge and forward-looking skills is the key to governing this phenomenon. To achieve this goal, institutions, universities and firms must make a significant shared commitment. Each actor in place should activate the right policies to provide its students/researchers/workers/citizens with the right opportunities in terms of education, professionalising and refresher courses (also in a lifelong learning perspective).

A continuous educational and professional updating process, which allows individuals to remain involved at all times with the technological advancement registered in the society, must be made available. This would allow individuals not to be marginalised once their acquired skills/competencies become obsolete and will contribute to their and the societal well being.

Of course, it is extremely difficult to activate this objective and the mechanisms to put in place range from active labour policies to training and update courses by firms and universities. In order to understand which could be the most forward-looking policies, it is necessary to know the context and the specific situation of each European country. In particular, it is extremely important to assess the most needed skills from a labour market perspective, since in this way it is possible to provide students /researchers and workers with the right educational tools, functional and transversal in different fields. But it is even more important to provide a method. Indeed, only through an understanding of the reality of the economic world is it possible to detect the necessities and contingencies of the labour market, therefore allowing the universities to adapt their courses and their vision with the context in which they are immersed.

In order to encourage the collaboration between university teaching and research and the business world, it is crucial to make students and researchers aware of the current problems faced by firms and companies. However, it is fundamental to highlight how significant differences persist across countries and regions, in terms of availability of public funding, educational systems and labour markets dynamics. Each of these potentially long-lasting structural problems requires a targeted and dedicated policy.

Inspecting the NEET indicator (neither in employment nor in education and training)¹⁴, the cross-country differences appear large, showing a worrisome situation especially for Spain, the United Kingdom and Italy¹⁵. Germany, Netherlands, Sweden and Hungary seems to perform better, with a

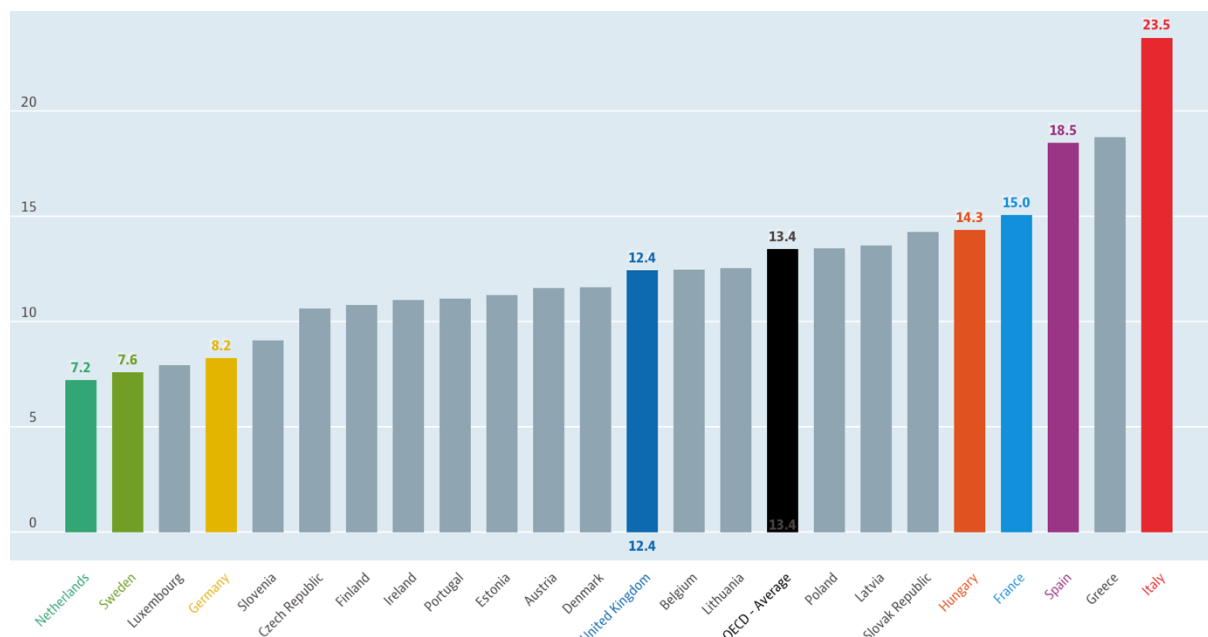


Figure 7 Youth not in employment, education and training (NEET) 15-19 years-old men/ 15-19 years-old women/ 20-24 year-old men/ 20-24 years-old women, % in the same age group,

NEET percentage lower than the OECD average (Figure 7¹⁶). However, in 2021, Eurostat has estimated that the share of young people neither in education nor in employment/training is around 13%, four percentage points higher with respect to the EU 2030 target. Even taking into account the fact that in the recent decades labour markets have become more fluid and young people are changing jobs more frequently, it is fundamental to track this indicator, since it gives important insights about the quality of the transition between education and work in each country.

Related to this issue, it is important to highlight how public spending on active labour market programs (PES)¹⁷ have experienced a progressive negative trend in the recent years for all European countries, including EUniwell ones. This is particularly alarming, since only efficient labour market policies, capable of supporting workers, activating recruitment incentives, providing unemployment benefits and insurances, have the potential to create a more efficient and attractive environment for business and economic activity. Moreover, a well-functioning labour market plays a crucial role in reducing skill mismatch and managing other phenomena such as emigration and brain drain.

¹⁴ An indicator calculated as the percentage of the population of a given age group/sex which is not employed and not involved in education/training activity over the total population of the same age group and sex Eurostat

¹⁵ <https://data.oecd.org/youthinac/youth-not-in-employment-education-or-training-neet.htm>

¹⁶ <https://data.oecd.org/youthinac/youth-not-in-employment-education-or-training-neet.htm>

¹⁷ They include programs of training, hiring subsidies, unemployment benefits OECD

As highlighted by the European Investment Bank (EIB) (2018), skills shortages and skill mismatch are usually more pronounced in those countries that have experienced a more dramatic brain drain, namely the departure of qualified and educated people from a country, or a specific economic sector or a particular field for better pay or living conditions. By employing the World Bank data¹⁸ on human flight and brain drain, in Figure 8 we can visualize the trends of this indicator for each EUniWell country from 2006 to 2021¹⁹. The United Kingdom pattern is interesting, since the brain drain is much higher after the Brexit referendum in 2016 while Sweden has the lowest brain drain, around -5.89% decreasing growth rate. Although it is extremely difficult to disentangle the macro-dynamics that concur in influencing this indicator, this data can give us some insights about the heterogeneity in which the EUniWell network operates. Partner Universities should cooperate more closely to enhance research collaboration and the “migration” of researchers within the consortium (therefore compensating for brain drain).

Emigration of qualified workers has been detected as one of the main factors that may explain skill mismatch (European Investment Bank (EIB) (2018)).

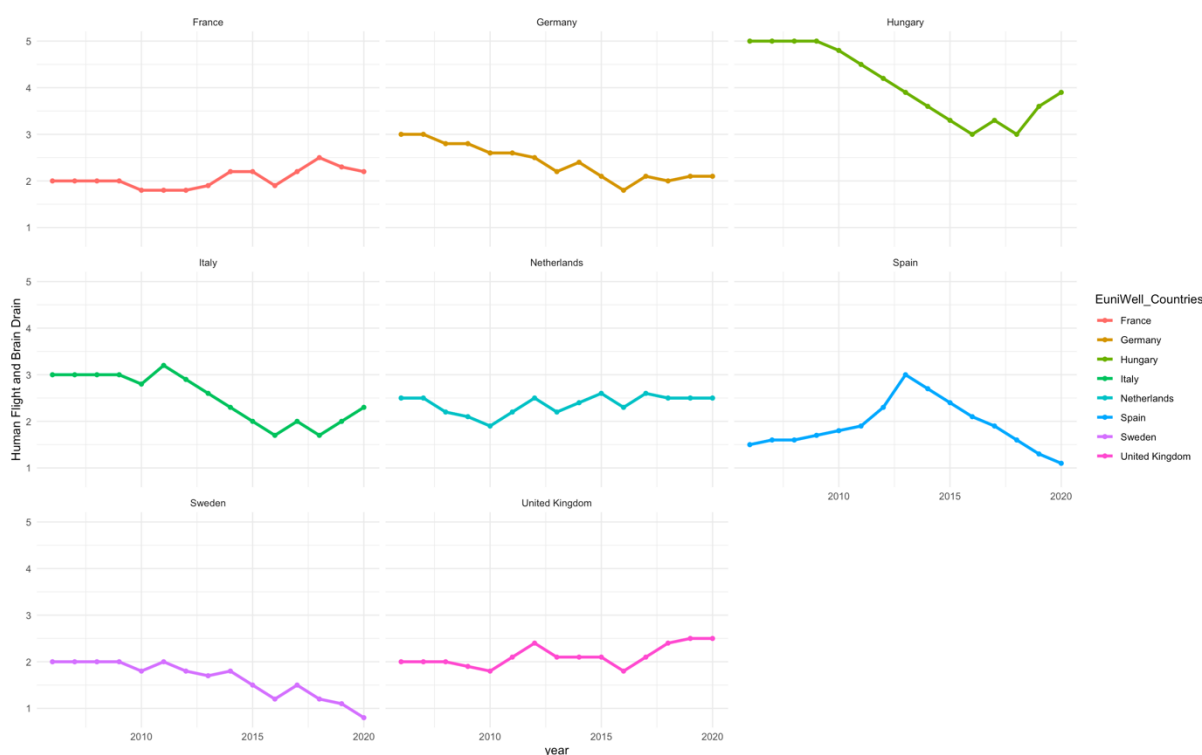


Figure 8 Human Flight and Brain Drain for EUniWell countries (Author's elaboration)

This is confirmed by inspecting the data on unemployment rate by education level. Indeed, what emerges it is that those countries that have an higher level of education experience in general a

¹⁸ https://tcdata360.worldbank.org/indicators/ha03234ca?country=ITA&indicator=43980&countries=FRA,DEU,SWE,ESP,GBR,NLD,HUN&viz=line_chart&years=2006,2021

¹⁹ Important regional differences exist, but there are no data to inquire at regional level (where partner Universities are located).

lower unemployment rate (see Figure 9²⁰). This is in line with research by European Investment Bank (EIB) (2018) showing an increased job polarisation, where highly skilled professionals are more able to take advantage of the new economic environment, more technological and high-tech oriented. Indeed, in recent years it appears that firms which have considerably invested in new technology report a boost in productivity of around 10% on average (*European Investment Bank (EIB) 2018*).

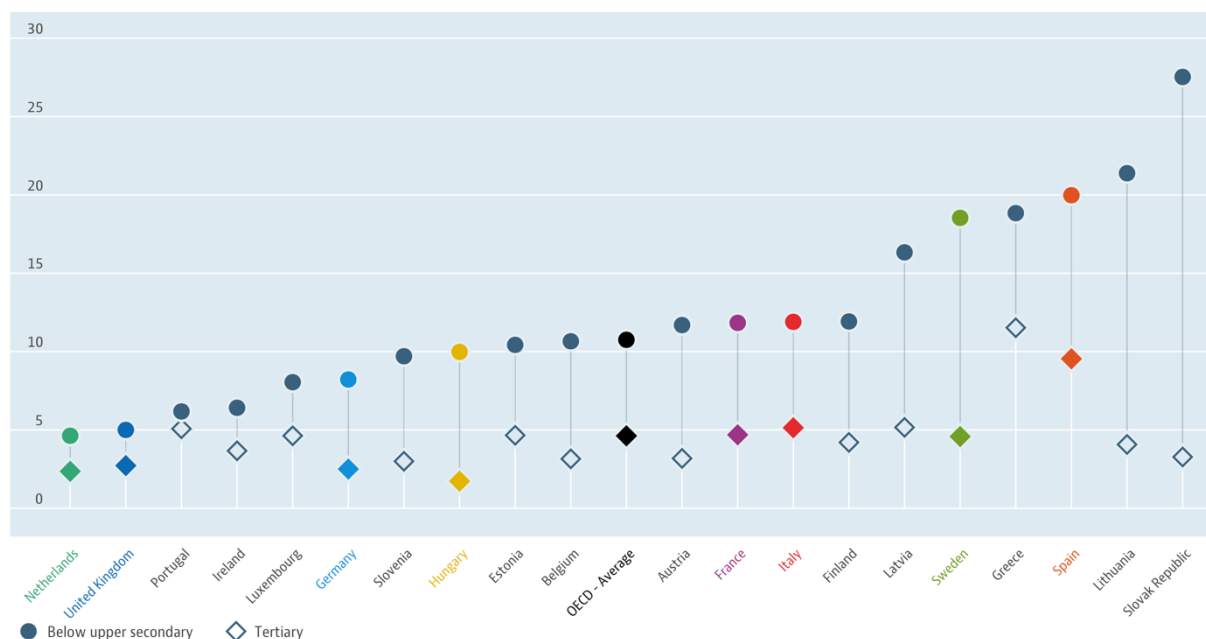


Figure 9 Unemployment rates by education level (below/upper secondary Vs Tertiary), % of 25-64 years olds, 2020

However, the share of training investments promoted by firms for developing digital skills does not exceed 30% in the European area, while the share of investment in training opportunities for employees has progressively decreased from 10.41% in 2016 to 9.58% 2021 (EIB Investment Survey²¹), see also Figure 10²². This is especially counterproductive in light of the fact that the share of firms which report as a major obstacle the lack of availability of staff with “right skills” has increased from 38.56% in 2016 to 47.33% in 2021 (EIB Investment Survey).

As pointed out by *ManpowerGroup*, we are seeing a “talent shortage” of historical scale. By surveying more the 40.000 employers across 40 countries and territories, what emerges is that talent shortages are a dramatic concern which affects all industries. Talent shortages range from 72% in the construction sector to 76% in manufacturing and IT technologies (ManpowerGroup²³). Nonetheless,

²⁰ <https://data.oecd.org/unemp/unemployment-rates-by-education-level.htm>

²¹ <https://data.eib.org/eibis/graph>

²² European Investment Bank (EIB). 2018

²³ https://go.manpowergroup.com/talent-shortage?__hstc=199844081.35cf28483633aa8e5407d5bd14b0b8f2.1654590967566.1654590967566.1654590967566.1&__hssc=199844081.1.1654590967566&__hsfp=2557066438&hsCtaTracking=640d3974-4fe4-4f15-b5ad-3067972736e1%7Cd99c3f04-c2e5-48da-b3bd-b106fb0dd59e

it is important to stress the significant country disparities and considerable within-country variation in terms of share of firms investing in training (European Investment Bank (EIB) 2018).

Skill shortages are a pervasive feature of our time that needs to be addressed. In order to do that, an effective talent strategy able to consider and compromise between different elements is necessary. In the next section, we suggest which are the most needed skills on the market, and which should be the strategy to manage this phenomenon.

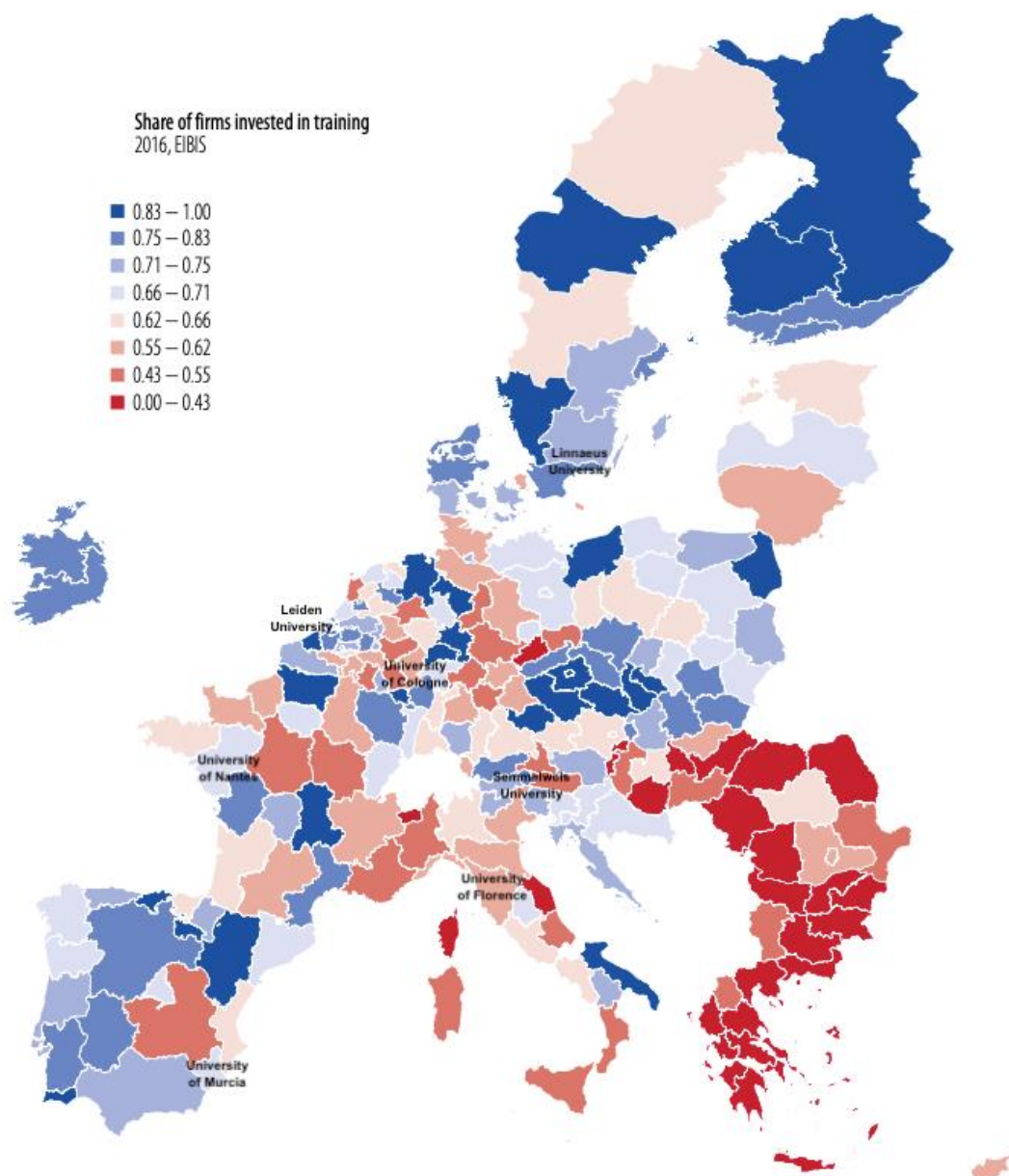


Figure 10 Share of firms investing in training

3. Skill Shortages

As already mentioned, the pandemic and the war have dramatically accelerated a process of radical labour market change. Remote work, the resulting organisational and managerial changes, and the urgency of having digital skills have called for a labour market revolution. The rise of remote work makes us rethink the nature of how we collaborate, foregrounding not only digital, but also soft-skills. **Thus, the future of work and research, that are more than ever interconnected, will rely not only on task-oriented, technical, hard-skills, but increasingly on the capacity of dealing with ambiguity and complexity, relying on problem-solving and collaboration.**

We are assisting to a profound conversion of our societies. On the one hand, jobs and skills are dramatically transformed by the Fourth Industrial Revolution, and, on the other hand, economic and demographic changes, precipitated by the effects of Covid-19 and more recently the war, have put additional stress on the workforce and on funds dedicated to academic research.

Although, as already discussed, skill mismatch should be considered a structural problem which requires targeted interventions (see also Appendix for further details), it is important to highlight the direction that universities and firms should take in order to do their part in managing this phenomenon.



Figure 11 Top Five In-Demand Roles and Soft Skills

Over these past years, workers were forced to adapt and to be more flexible to succeed in this rapidly changing environment. Entire industries are going digital, while some others have dramatically transformed over the past few years; a clear example are fast-paced industries like Hardware and Networking [LinkedIn](https://www.linkedin.com/future-of-skills/)²⁴ which have seen an unprecedented increase. These industries are also a clear example of how research and development, in university and non-university contexts, are deeply interconnected.

The pandemic has given us an opportunity to reflect on what expertises are really essential for our societies, which are the fields of training and research that should be prioritized, and what skills we need to develop and improve (Figure 11²⁵). Indeed, as reported by the [World Economic Forum](https://www.weforum.org/agenda/2020/05/the-future-of-work-is-here-5-ways-to-reset-labour-markets-after-coronavirus-recovery/)²⁶, most essential workers have appeared to be those in the lowest-paid and the most precarious roles, and at the same time studies have shown how Covid-19 downturn has left many college graduates

²⁴ <https://linkedin.github.io/future-of-skills/>

²⁵ <https://go.manpowergroup.com/talent-shortage>

²⁶ <https://www.weforum.org/agenda/2020/05/the-future-of-work-is-here-5-ways-to-reset-labour-markets-after-coronavirus-recovery/>

without a job. The World Economic Forum²⁷ argues how right skills should be favored over academic qualifications alone.

As reported by LinkedIn, both hard and soft skills are rapidly evolving, and will change up to 44% by 2025. However, many of the most required skills in these last years have remained the same, despite the changes that have taken place. This translates into the fact that in most fields the priority should be to upgrade and refresh the already acquired knowledge.

A clear example is the Data Analyst figure, which since 2015 is one of the most required profiles in the job market. Starting from the insights of ManpowerGroup²⁸, the strategy to follow is to invest in learning and development, cultivate communities able to cooperate outside the single organisation, make different stakeholders communicate and favour increasing interactions between the worlds of work and academia.

The mismatch problem is not only one of adapting the university educational offer to the professions of the future, but is also framed within lifelong learning processes, such as upskilling or reskilling for those already working, outside and inside academia.

In this regard collaboration between the public and private sector should be considered as a way to advance a new agenda that provides more resources and tools to both kinds of agents. Indeed, education and training should provide the skills demanded in the labour market, and at the same time employers should put in place different strategies to increase the attractiveness for unfilled job positions, through improving working conditions and increasing salary. Moreover, **the collaboration between university research centres and private partners may create fundamental synergies, which can help to develop targeted and transversal skills, bridging the skill shortcoming detected in the labour market.**

Identifying which are the most required skills and which are the areas that necessitate more investments is very complex and extremely context specific. However, by relying on the data of the OECD²⁹, which take into account skill, abilities and knowledge, it is possible to have a preliminary picture. What appears clear is that Europe as a whole (and the countries where EUniWell partners are situated make no exception), though with important heterogeneities between countries, is facing a dramatic skill shortage in most fields (see Figure 12).

By inspecting skills separately for each EuniWell country (see Figures 13-14), it seems that technical skills, defined as those which concern “*the capacities to design, set-up, operate and correct malfunctions involving application of machines or technological systems*” OECD, are in a relative excess with respect to the EU average. Netherlands and Sweden appear to even have those skills in excess with respect to the ones required to the job market, while Italy seems to be the most skill-deprived country.

²⁷ <https://www.weforum.org/agenda/2020/09/reckoning-for-skills/>

²⁸ <https://go.manpowergroup.com/hubfs/Talent%20Shortage%202022/MPG-Talent-Shortage-Infographic-2022.pdf>

²⁹ [https://www.oecdskillsforjobsdatabase.org/imbalances.php#FR/_/_/\[%22skills%22%2C%22knowledge%22%2C%22abilities%22\]/co](https://www.oecdskillsforjobsdatabase.org/imbalances.php#FR/_/_/[%22skills%22%2C%22knowledge%22%2C%22abilities%22])

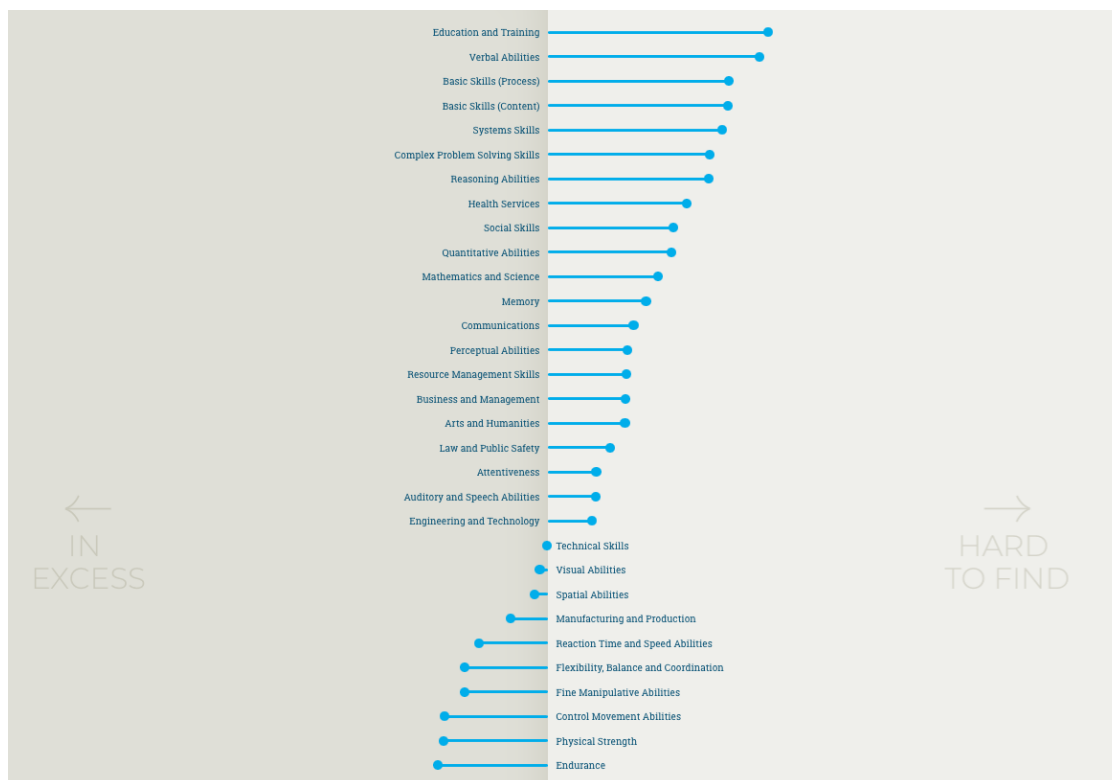


Figure 12 Skills for Jobs OECD

In order to have a more accurate and detailed overview of the skills shortages, where it is possible, we disaggregate the analysis to the region level. In particular, we draw two maps in which the skills for jobs in excess or considered hard to find are represented for each EUniWell country.

Figure 13 reports the most in-demand skills for Central Hungary, West Midlands and Tuscany, the regions in which the university of Semmelweis, the University of Birmingham and University of Florence, respectively, are located³⁰. For the universities of Leiden, Linnaeus, Nantes and Cologne, as well as Murcia, however, we need to rely on information aggregated at the national level (which can only be considered as a first approximation). In each box the darker areas represent the skills that appear to be in excess in the labour market, while the clearer areas report the most hard to find skills, as for the Figure 12.

Using as reference point the European situation, represented in orange, we have a clear picture of the EUniWell partner performance. Although for most of the countries hard to find skills are in line with the European Union, there is some cross-country and regional variation that is important to highlight. For the West Midlands (University of Birmingham), it appears that having social skills, defined as “*developed capacities used to work with people to achieve goals*”, is an advantage in finding an occupation, meaning that the employment in legal, social, cultural, and related associate professionals, as well as sales and protective workers, seems to grow faster than the European average. This result seems to be inverted for Central Hungary (Semmelweis University), in which social skills seem to be really hard to find with respect to the European average. Conversely, technical skills are the workhorse of the region, indeed metal, machinery, but also information and

³⁰ For these countries, the OECD provides information at regional level.

communications technology are the sectors which register a faster employment growth. Tuscany (University of Florence), instead, coherently with the information that can be retrieved for the Italian case as a whole, seems to be suffering in most fields.

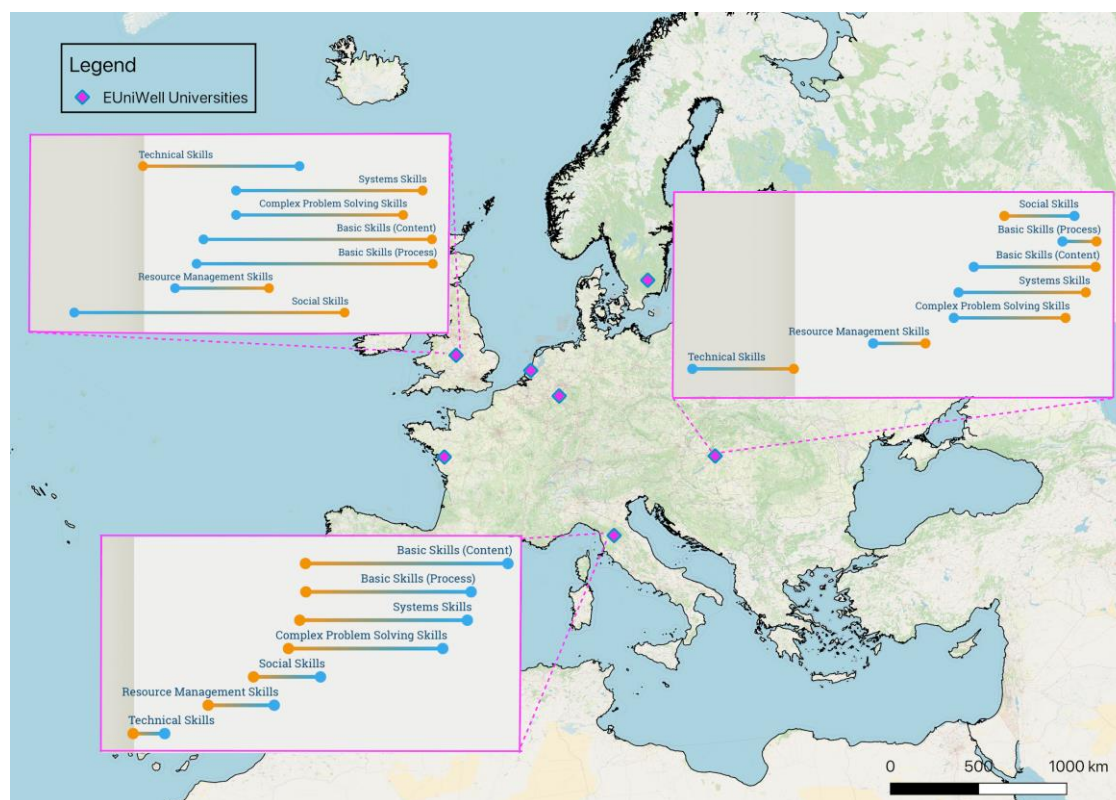


Figure 13 Regional Needs: Central Hungary, West Midlands and Tuscany (Author's elaboration)

As far as the analysis at the country level is concerned, the Netherlands seem to rely on a sound arsenal of technical skills, although less pronounced than Central Hungary, while it experiences a situation that is worse than the European average on the remaining skills. Results for Germany, Sweden and France are similar, even though for France, it seems relatively easy with respect to the European average to find basic and complex problem-solving skills.

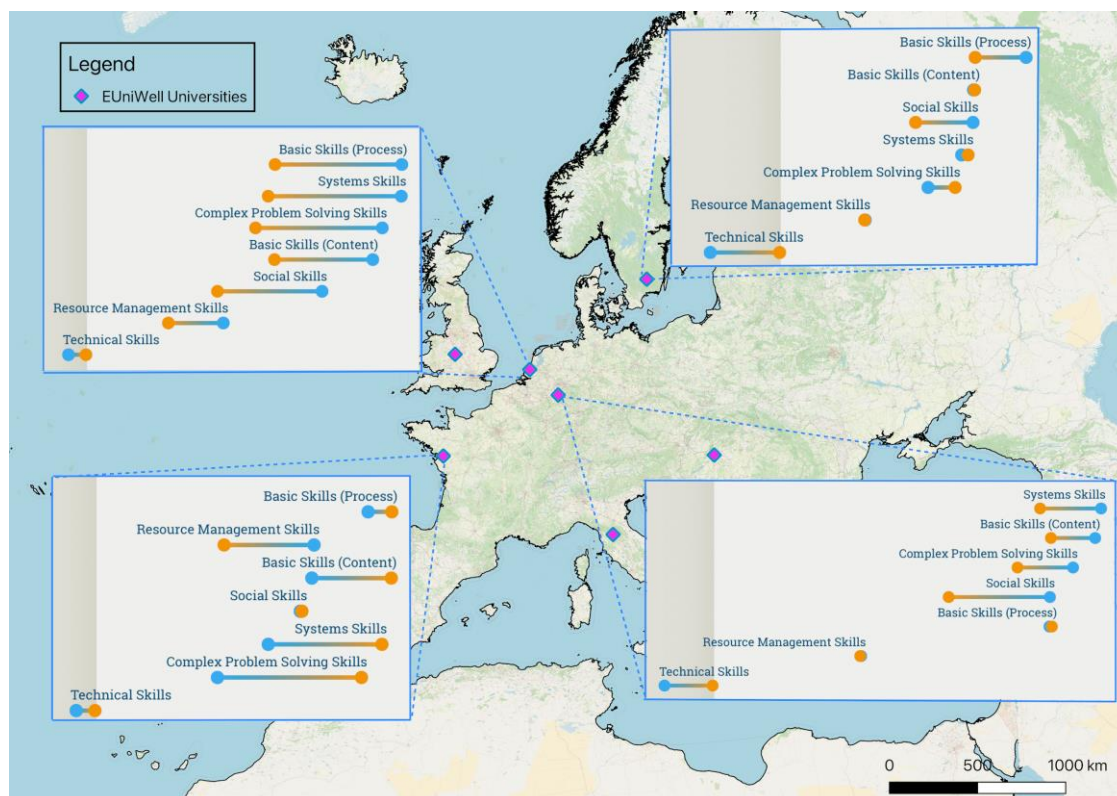


Figure 14 National Needs: France, Germany, Netherlands and Sweden (Author's elaboration)

In summary, technological changes, including automation, machine learning and artificial intelligence, challenge workers and carry out a risk of further increasing disparities in most EUniWell countries, with a negative impact on well being.

The new technologies are progressively changing the skills requirements needed in labour markets of all the countries considered. As a consequence, job market requirements are shifting in most countries towards non-routine, analytical and social skills. The geographical heterogeneity between countries is also accompanied by a strong heterogeneity of skills levels across countries, urban-rural areas and age groups. Hence, reskilling policies for low and middle-skilled workers will be crucial for sustainable and inclusive economic growth.

The impact of the pandemic has been asymmetric across countries, across economic sectors and especially across classes. Depending on the degree of social contacts needed to perform an economic activity, the pandemic has impacted differently each type of worker, requiring a change in work mobility and adaptation to the use of new technologies.

Universities, as already mentioned, should play an important role in offering specific and targeted courses to promote effective integration with the labour market, with the aim of increasing well being.

A holistic skill approach seems to be the main important strategy that each university should pursue in the coming years. Notwithstanding important differences specific to each field and to the

occupational categories connected to the specific skill needed, Figures 13 and 14 give us crucial information with respect to the overall picture of the situation in each country.

However, an analysis at a more granular scale might bring out counter-trending results for each individual EUniWell Universities. In the next section, we present a skill portfolio for EUniWell Universities that we believe to be able to provide alumni and researchers with adequate tools to face the challenges of our times.

4. Skills Portfolio: indications for EUniWell partner Universities

Figure 13-14 can be considered as preliminary conceptual maps from which to start moving in order to offer students/researchers the best suited set of courses and skills requested by the local reality with which they have to interact or indication of how to cooperate between partners.

It is paramount that universities plan their courses and curricula in the most forward looking possible way, anticipating future trends and potential future requirements of the labour market. Indeed, this is the only way to make universities truly directors of events and not mere actors who must adapt to the contingencies of tomorrow's market fluctuations.

It is crucial that universities regain a first-order role, dictating the agenda of the future, and thus promoting the ideal of a fairer, more equitable and definitely more sustainable society. We are living in a very dynamic, connected and extremely complex world. Technological changes are accelerating, and it is increasingly difficult to stay on the frontier. However, like never before, it is crucial to be able to try to anticipate the most needed professional figures, qualifications and skills. The rise in the international skill competitiveness is a critical indicator of how appropriate and renewed skills represent a strategic long-term asset for the economic future of companies and of entire nations.

Therefore, it is fundamental to take into consideration predictions which offer a plausible scenario of the future European landscape. In this sense, Figures 15 and 16³¹ represent extremely important information, showing forecasted annual employment growth (in percentage) across sectors and occupations for 2020-2030, respectively.

Starting with Figure 15, the graph sums up some of the considerations we have made in previous sections. Two sectors turn up to be the ones that are likely to experience an impressive annual employment growth: *health & social care*, and *ICT services*. This result is not surprising. In particular, population ageing and the Covid-19 pandemic have made us reconsider the important role played by the health sector, as well as the role of ICT skills. On the other hand, *agriculture, forestry & fishing, mining & quarrying*, and *manufacturing* are among those sectors that are expected to see a significant reduction in their employment growth. These sectors are those that on average employ mostly workers with a lower level of qualification. These data then, could be seen as the result of offshoring processing towards emerging economies and job polarisation toward increasingly skilled jobs. In line with these predictions, Figure 16 reinforces the argument, showing in particular how

³¹ https://www.cedefop.europa.eu/en/tools/skills-intelligence/future-employment-growth?country=EU27_2020&year=2020-2030#2

farm and related workers are forecasted to decrease, while on the other hand more qualified professional jobs are expected to experience a significant increase.

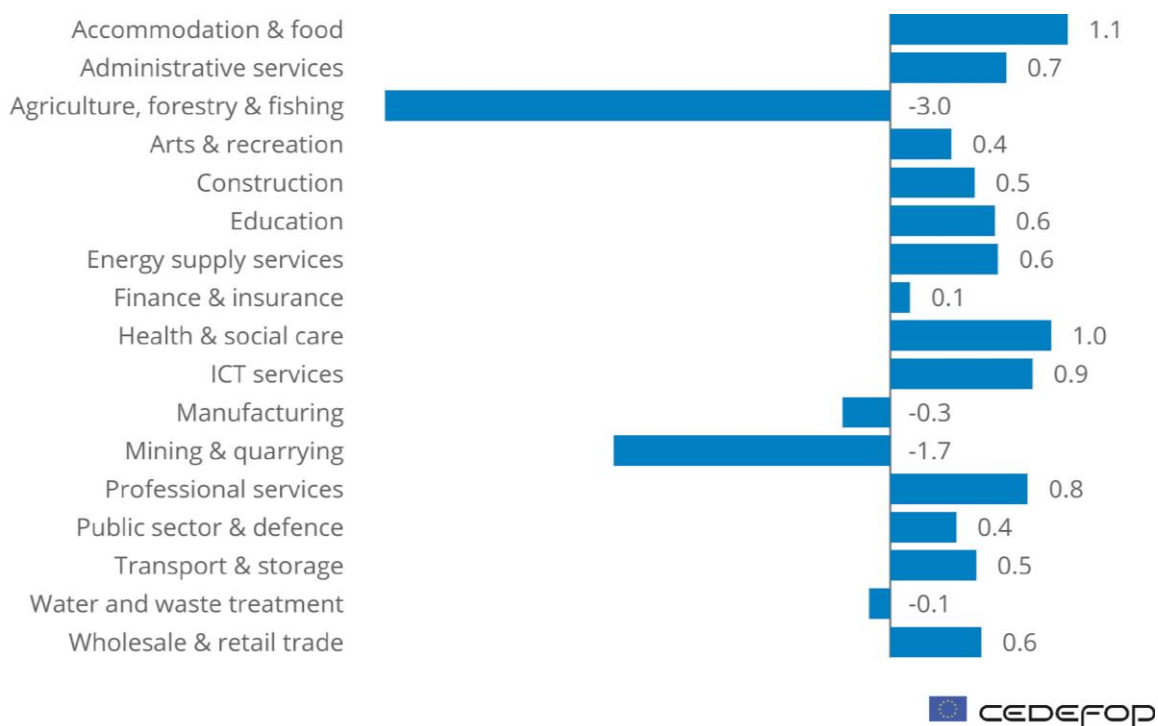


Figure 15 Annual Employment Growth (%) across sectors in EU27 in 2020-2030. CEDEFOP

Although these data are informative, other crucial and collateral determinants should be held in consideration to anticipate the potential future trends which may shape the future European occupations and skills. Indeed, other complex dynamics and phenomena will have a role in affecting our future labour markets and education policies.

At least five long-term trends can already be named as those that will have a primary role in next few decades: i) first of all climate change, and all its implications in terms of water and energy supply, international politics, food insecurity and social inequality; ii) demographic change, with subsequent problems of intergenerational equity, and migration, with correlated political tensions and debates; iii) the emerging role of developing countries in global economies, which makes us rethink our position in the global economic market; iv) drastic changes in organisational structures of business and activities, with digital platform technology driving the reorganisation of firms, as we have in part experienced during the Covid-19 pandemic; v) communication technology, which has the potential to shape public opinion, polarise political debate, decentralise information and influence the political elections results.

These are of course macro categories which are strictly interconnected, with important and to some extent even unpredictable implications. Keeping in mind how many factors are at play that may constantly challenge the skill balance of supply and demand, it is paramount to understand why it is a very complex task to recommend a skills portfolio. There is no simple recipe to follow to optimise university courses and indicate the most needed abilities, anticipating future trends. Moreover, another crucial point that is fundamental to highlight is that in the next few years the areas of

expertise may be even more specialised, and it will be even more challenging to recommend which skills are to be strengthened, unless experts in each specific field are relied upon.

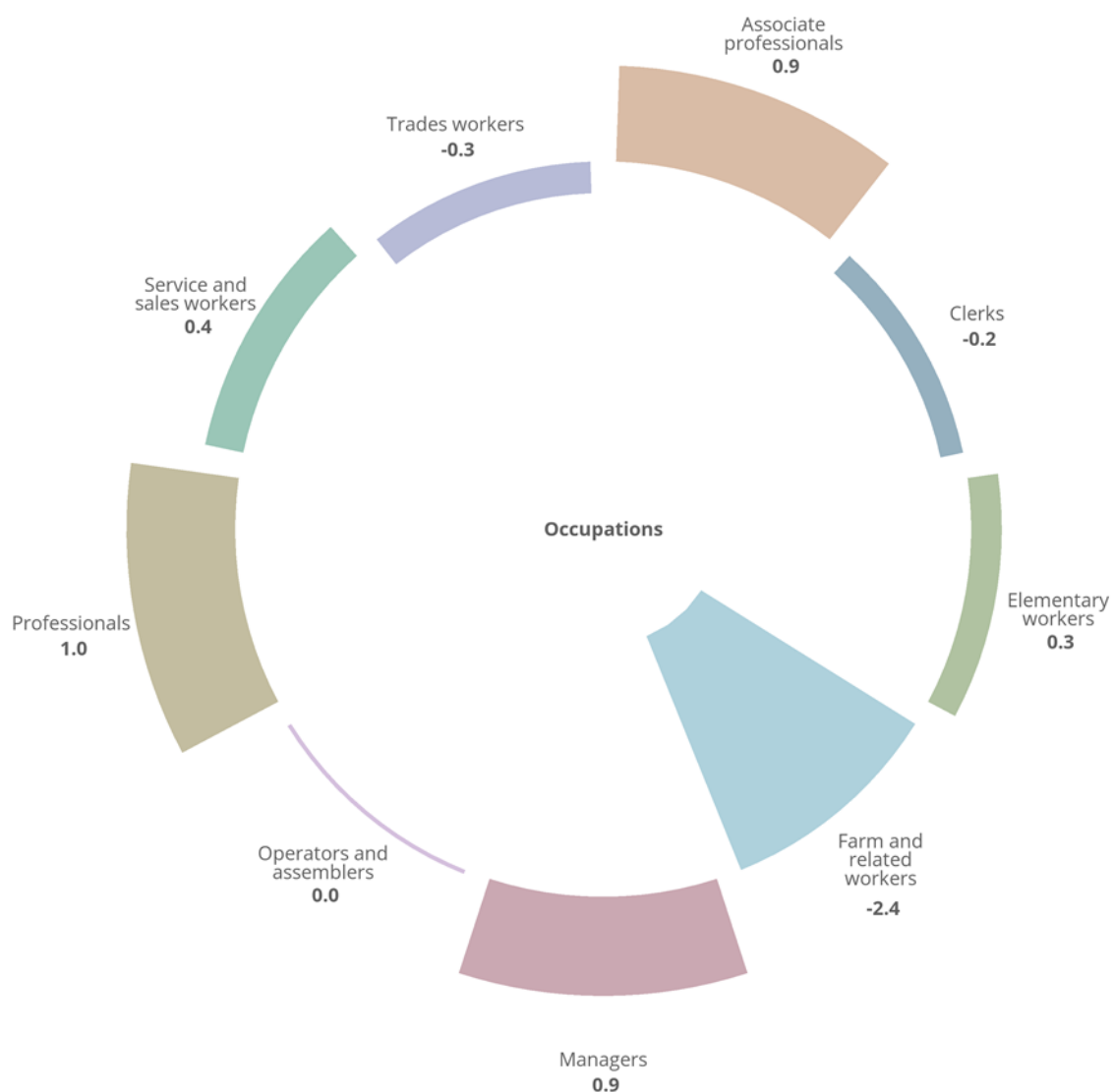


Figure 16 Employment Growth from Occupations in EU27 in 2020-2030

Only understanding the complexity of the world in which we are living can help us shed light on what could be the contribution of university to increase the well-being of citizens, the society, and the economic system. Indeed, what emerges from the previous analysis is that universities with their traditional curricula can never totally provide an up-to-date knowledge base at the technological frontier and therefore all the skills requested. Throughout history education has won the race with technology; however, it is not clear whether it will be able to do that in the future (see Figure 17³²). Nowadays, we are assisting to a situation in which young people graduating from

³² <https://www.oecd.org/education/2030-project/>

universities have a hard time finding a “good” job, and at the same time, employers do not find people with adequate levels of skills. This is a trap that the Covid-19 pandemic, while highlighting that the connections between different skills (e.g. digital and traditional health systems) have only accelerated, causing job dissatisfaction, rising inequality and distrust in the institutions, seen as powerless over these mechanisms. Thus, we assist to an overall decrease in the level of well-being, which foments a general sense of frustration, where efforts and sacrifices are not rewarded.

In order to keep pace with undergoing technological, economic and social transformations, the education sector needs to clarify which should be considered the most important skills and competencies to allow individuals to navigate this chaotic world. Therefore, the university has the duty to provide a set of competencies that make individuals able to develop their critical ability to understand the reality in which they are immersed and a learning method that can be adapted to an ever-changing labour market environment. These skills can be provided also in innovative ways, e.g with Moocs³³, microcredentials, nano degrees rather than just relying on traditional curricula.

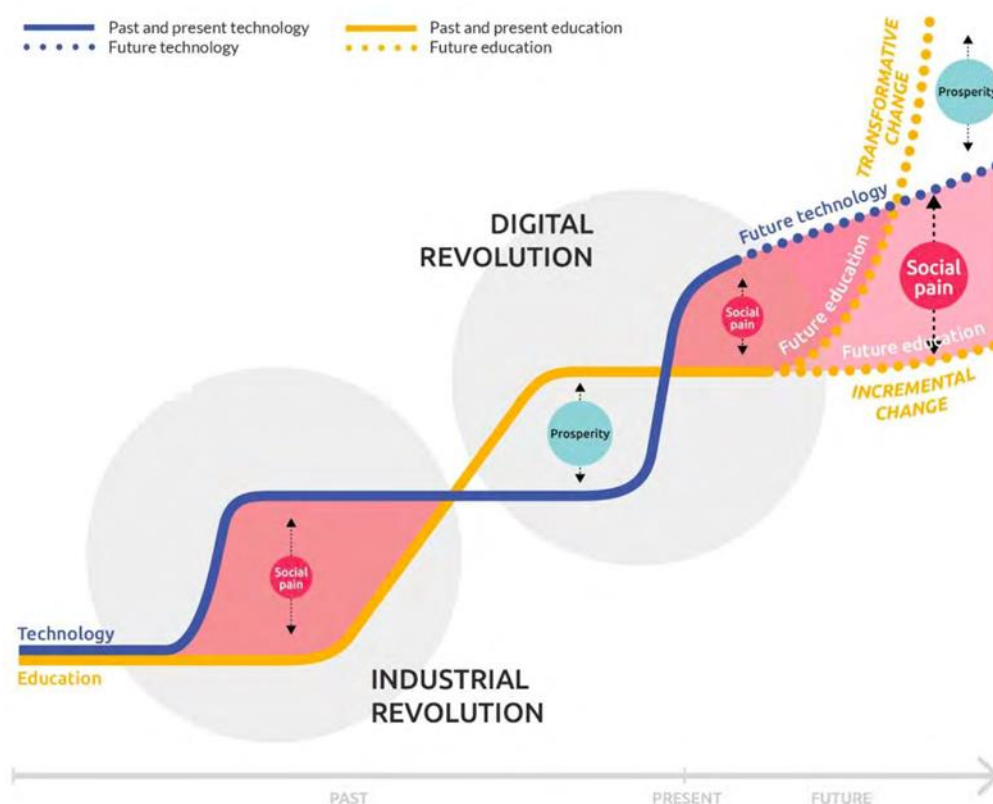


Figure 17 Relation between technology and education

Moving from the insights provided by OECD 2019 and CEDEFOP³⁴, we elaborate a conceptual map that is represented in Figure 18. According to both OECD, 2019 and CEDEFOP, the most important set of skills are those that OECD 2019 defines in its "Learning compass 2030" as “core foundations”,

³³ Massive Open Online Course

³⁴ <https://www.cedefop.europa.eu/en/tools/skills-intelligence/importance-foundation-skills?country=EU&year=2014#1>

meaning those that represent the basis for developing further skills and competencies. The concept of literacy and numeracy, and its evolution in terms of digital and data literacy are fundamental capacities to have in order to process, interpret and organise information. Without these building blocks, any further learning is difficult to attain, and possible synergies with additional skills are devoid of their transformational power. The Transformative Capabilities, instead, are those that may represent our comparative advantage against artificial intelligence, and if well trained have the potential to create important complementarities with such technologies. Indeed, although AI is very good at recognizing patterns and extrapolating from it, it is not yet able to think beyond the current paradigms. Our ability to create, instead, give us the capacity to navigate ambiguity, and to manage and resolve tensions and dilemmas. Moreover, when we adapt our ability to mobilise our cognitive, social and emotional resources, we are able to cooperate to solve complex problems and elaborate new strategies and ideas.

In a volatile and complex world, being creative and possessing an entrepreneurial spirit will be two factors that will play a key role in the future. Furthermore, in the next few decades, work will be even more interconnected and network-oriented. Employers will require the capacities to work across different disciplines and also to stimulate the “hybridisation” of skills (Störmer et al. 2014). With the expansion of technology and global interconnection, jobs will necessitate the competencies to team up virtually, but also the capacity to demonstrate cultural sensitivity.

Collaborating and working together are fundamental skills that represent the most important ones in the transversal skills block. This set of skills have a “high transferability across jobs and sectors” (CEDEFOP), and are solid investments to boost prospective university curricula. Indeed, the transversal skills are those that can be adapted in different environments and across different disciplines.

Borrowing from the terminology of OECD 2019, **Building Skills, Transformative Capabilities, and Transversal Skills should be seen as the “compass” upon which context-specific job skills can be developed and well being improved. In this perspective, universities provide these building blocks skills, with a high transferability across contexts and disciplines, fundamental in the continuous process of skill absorption and orientation.** The future is difficult to predict, therefore universities, and also companies, do not know which skills, qualifications and abilities will be in high demand but they can provide them with a framework of mind to be able to “surf” the changes. The best education systems can do is indeed to give students and workers a broad understanding of the range of skills that could be relevant and how different occupations rely on different skills. Contemporaneously, universities must become better at anticipating alternative futures and preparing for alternative scenarios. If they are able to do that right, we will be also well prepared for the future that eventually arrives. A typical example is the discussion on whether technology is substituting for less-skilled workers and complementing high-skilled workers, generating skill-biased shifts in labour demand, a topic strictly connected to the discussion on routine versus non routine jobs.

We used to “learn to do the work, now learning is the work” (Andreas Schleicher³⁵). **A good workplace is a place in which learning is possible and well being central.** Although it is crucial that companies take responsibility for training their workers, the role of universities and institutions

³⁵ <https://www.youtube.com/watch?v=1geyCmJvQC8>

is equally critical. In this context micro credentials have the potential to play a crucial role in strengthening a link between education and the business world.

The certification of skills becomes increasingly important since employers need clear signals of workers' abilities. Indeed, firms and companies are increasingly testing skills on their own, relying less on diplomas and qualifications. To regain its rightful educational role, universities must be in charge of the certifying skills process. *Micro credentials* then, may open this possibility, as they represent a powerful tool to recognize skills at a more granular level and can be very useful also for life long learning and upskilling.

Lifelong learning activities will become increasingly important to keep workers' skills aligned with evolving job market demands and to support longer working lives (i.e. also helps adjusting to the demographic changes). Moreover, *micro-credentials* give ownership on *when, where* and *what* to learn. However, to make *micro-credentials* a real opportunity for educational growth available to all equally, the role of institutions is crucial. Otherwise, the risk is to fuel a process that increases class inequality, marginalising those who cannot afford to invest in their own upskilling processes.

The synergies of institutions, employers, and universities is fundamental for the future well-being of our societies. Only active labour market policies, not exclusively at the national, but at the European level, have the strength to guarantee the protection against the threat of human capital deterioration, avoiding frictional unemployment, and supporting the sectoral reconstruction of the economy. Only collaborative processes, at the Alliance level, have the strength to provide ideas and background for a a better life.

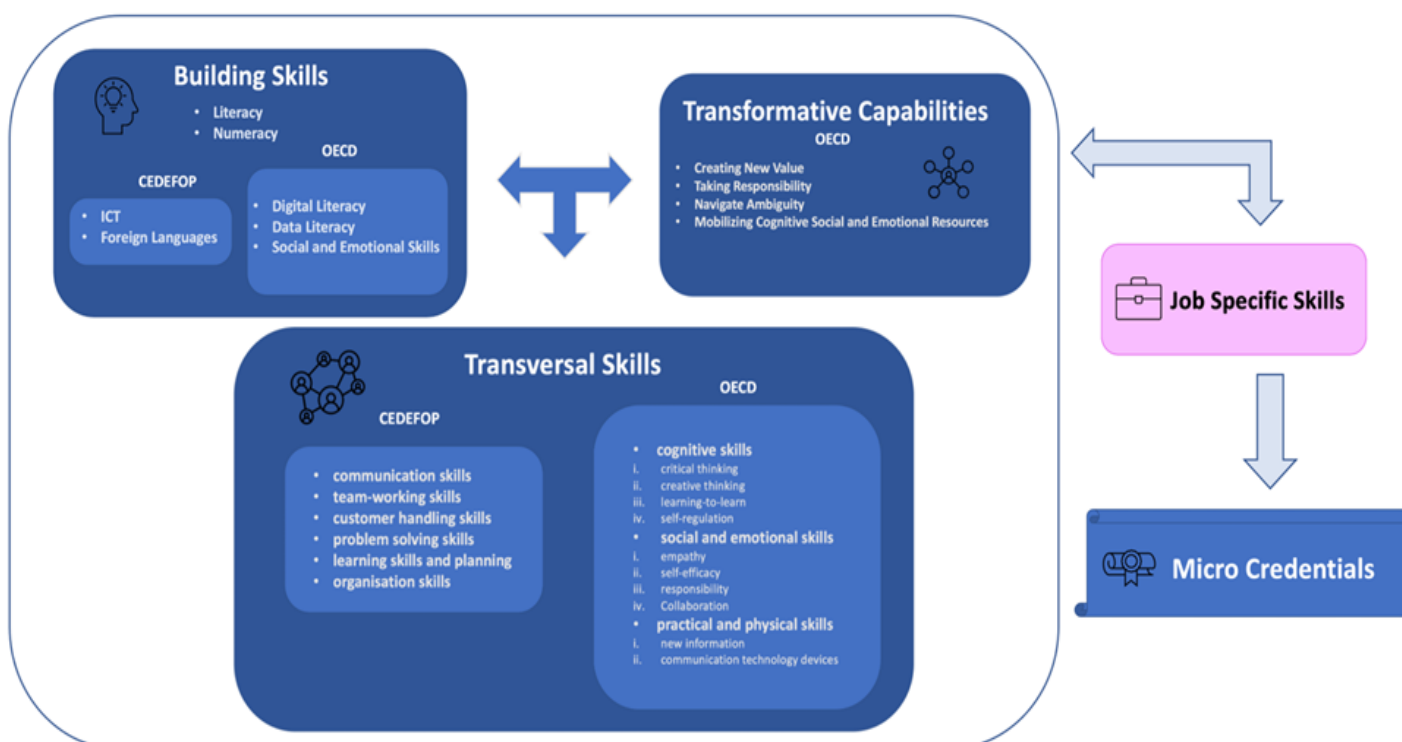


Figure 18 Conceptual Framework based on the insights provided by CEDEFOP and OECD, 2019

5. Skills to Prioritize: a focus on researchers

EUniWell Universities are at the moment fairly well placed in providing the right skills to their students, staff and researchers³⁶. To be equally well or even better placed in the future they should increase the emphasis on developing non-cognitive skills that complement digital and technical skills, such as social intelligence, collaboration, creativity, multiculturalism and adaptability. Hence, EUniWell should provide researchers, educators, and staff with the skills and motivation to “create research- and challenge-based educational programmes that deliver critical thinking, intercultural competence, entrepreneurial mind-sets and civic responsibility” (EUniWell web site). **The main aim is to boost the co-creational process of EUniWell as a comprehensive European University.**

With this in mind, the consortium promotes staff and student mobility in academic research, teaching, and administration through a variety of activities: including (i) outreach events (including Open Lecture Series, Policy Commissions, Mayors’ meetings, panel discussions etc); (ii) Scientific conferences; (iii) hackathons; (iv) workshops (v) Summer and Winter Schools (vi) specific courses and microcredentials, all of these activities being linked to the Conceptual Framework. Figure 18 under the heading 'Building skills' emphasises the importance of literacy and numeracy. According to our analysis, the most relevant skills are:

1. Digital and data literacy
2. Social and emotional skills
3. ICT
4. Foreign languages

However, looking at the rapid transformations and events of the past three years, we must not forget that additional skills might become relevant.

The world is very uncertain due to the climate and health crises and political instability and against this background, leaders and professionals are beginning to increasingly value ethical and environmental skills.

Changes, furthermore, do not happen in a vacuum: for instance, we mentioned that changes in technology may affect the skill mismatch through a lack of skilled workers availability; however, changes in labour supply may in turn be driving automation and therefore skills demand (a biunivocal relation). Automation and robot adoption, moreover, are most used in industries affected by a scarcity of manual workers as a result of demographic ageing etc. All this points to a very high complexity.

We have seen that skills shortages or mismatch in the EU are still high and have increased as a consequence of the Covid pandemic. Furthermore, they are very likely to further increase as a

³⁶ We are assuming that the skills provided are transversal and excellent for both staff, alumni and researchers. However, it is important to highlight that current staff is not necessarily compounded by former students.

consequence of the war and the global warming. At the same time the perception of individual and societal well being is also changed. Workers now tend to make an assessment of what matters most, how they work, and where they work.

We already mentioned that according to the European Business and Consumer Survey, more companies than ever report in 2022 that their growth or investment is held back by labour shortages. In the European Investment Bank’s most recent Group Survey on Investment and Investment Finance (EIBIS survey), a lack of skills is the barrier to investment most often reported by firms (EIB 2021).

Workers (or students) with ICT, transition to climate neutral economy, and artificial intelligence skills are the most requested and least available (in all EU countries, including the ones where EUniWell Universities are located). EUniWell wants to be ahead of changes and has therefore already proposed several courses that go in the direction of “filling the gaps”³⁷. Furthermore, to try to answer to this increasingly pressing request from the labour market, as explained below, EUniWell has also established some microcredentials bearing courses (the first pilot starting in the fall 2022).³⁸ The microcredentials have the function of increasing the skills of participants (which can be students, PhD students, staff, and researchers of partner universities as well as staff at associated partners) in relation to the skills most in demand in the labour market and with the aim of increasing the well-being of the subjects involved. Microcredentials furthermore allow to increase collaborations between partner universities also through the research Arenas.

Referring to the EUniWell four research arenas, as an example, the following table shows the number of existing collaborations in SDG 11 (Sustainable Cities and Urbanity) between the EUniWell partner universities³⁹:

	University of Cologne	Leiden University	University of Birmingham	University of Nantes	University of Florence	Semmelweis University	Linnæus University
University of Cologne		331	78	33	64	44	5
Leiden University	331		202	48	92	61	13
University of Birmingham	78	202		150	120	28	2
University of Nantes	33	48	150		41	5	1
University of Florence	64	92	120	41		26	2

³⁷For instance, the University of Florence is starting a degree course “Sustainable Business for Societal Challenges” (<https://www.susbus.unifi.it/index.php>). The main objective of the Degree is indeed the management of the economic and social changes currently occurring in society, with a particular focus on the related challenges and opportunities and aims at providing students with theoretical and managerial skills in order to successfully manage social innovation and spur social entrepreneurship, as well as at helping students understand how manage the territory and the necessary resources to improve the well-being of the communities. The University of Koln is starting a Master in Peace Studies and the University of Leiden is starting a Master on Health. Several summer schools have also been organized. The University of Nantes is hosting a Master in Environmental Humanities, within the EUniWell consortium.

³⁸ <https://online.hbs.edu/blog/post/sustainability-skills>

³⁹ A similar number of existing collaboration is also present in the other Arenas, with Semmelweis University obviously accounting for more in the Health Arena.

Semmelweis University	44	61	28	5	26		2
Linnæus University	5	13	2	1	2	2	

Research (as the one depicted in the table) is usually carried out by senior researchers, but also PhD students and post doc are often involved (also through collaborative grants)⁴⁰. Cooperation on research is particularly important at the young researchers level, since PhD students and post doc have specific and diversified needs in relation to their particular condition. By cooperating in research within EUniWell partners, they can “see the world” in a different way and they can be given training and support in all aspects of an academic career – from publishing and presenting, teaching, applying for research grants and jobs. A particular focus can be placed on communicating effectively to different kinds of academic audiences from different points of view. This way, young researchers can become more employable and more conscious of their strengths.

For the EUniWell network, collaborations can be increased and consolidated by focusing on specific courses that aim to develop specific transversal skills, and can be divided into 5 thematic areas:

- | |
|--|
| 1. R&I design |
| 2. Scientific calculation tools and Big data |
| 3. Research data management |
| 4. Scientific communication and dissemination |
| 5. Public Engagement and Entrepreneurship |

The first area (R&I design) includes skills related to writing collaborative projects in the context of Horizon Europe and skills related to evaluation processes in EU R&I funding programs. In the current dynamic context of the Knowledge Economy and the European Research Area, researchers are increasingly expected to have new skills, beyond those acquired through "traditional" university training. In particular, this area should provide an overview of the main funding schemes at European level and indicate to young researchers what are the first operational steps to take if they want to participate in a competitive European call. Furthermore, the skills should be focused on a shift in the candidate's approach, highlighting the strengths and weaknesses of a project proposal from the point of view of a hypothetical evaluator. More specifically, the aim is to highlight the evaluator's approach and awareness of evaluation processes as key aspects for a successful proposal.

The second area includes the skills related to Big Data and the minimum skills that every researcher should have. Specifically, reference is made to the use of databases and the use of data writing and

⁴⁰ Research in this area has also been triggered by the seed funding call. The evolution over time of the applications shows that in the first calls the projects were written by three maximum four University on average, while in the last call most of the Universities were involved, showing an increase in cooperation.

analysis programs such as Stata, R, and Python. Subjects should have knowledge of the fundamental structure and basic operations. Machine Learning (ML) is also important, since it is the basis of most of the modern technologies used in everyone's life: the required skills are related to the basic concept of ML and neural networks.

The third area (research data management) includes skills related to the management of research data with particular reference to databases and digital tools to support research available within the EUniWell network (Funding institutional, Scival, Scopus, JCR - Clarivate, Research Gate). Attention should also be paid to the issue of Open Access of publications and research data with knowledge of the historical excursus, of the different models (green road and gold road), of the advantages of open access.

The fourth area includes the skills related to communication and scientific dissemination by addressing the different styles, strategies and tools useful for reaching a wide and non-specialist public (considering legacy and digital media). An important part in this area also is related to research ethics and should have a precise focus on the objectives and operating rules of institutions that deal with scientific research.

The fifth and final area includes the skills related to the enhancement of research results and their potential application in companies with particular reference to the identification and evaluation of inventions.

In addition, other skills to be developed are those relating to start-ups: how to conceive and build a start-up proposal, what objectives and what are the strengths and weaknesses of a start-up initiative.

If these types of courses can “fill the gap” of missing or obsolete skills for young and senior researchers, there are other typologies that can improve the well being of young researchers (i.e. PhD students and post docs).

More specifically, we identify 3 further areas in which to invest in training and in the structuring of skills:

- | |
|---|
| 1. Labour market and innovative research potential |
| 2. The researcher outside and inside the academy: doing well and feeling good |
| 3. Storytelling for innovation: communicating yourself, your goals and results |

The first area can include activities aimed at making researchers and doctoral students aware of their real prospects for future employment, in light of their specific path and the innovative potential that this can express. The second area may include activities aimed at consciously managing the transition from academia to work (or even between the various academic positions) having in mind the obstacles to entering the world of work or the difficulties related to the various career transitions. The third area may include activities related to knowing how to express oneself and knowing how to tell one's path, one's skills and how these can be used.

6. EUniWell Microcredentials: an instrument to reskill and upskill members

The EUniWell micro-credentials aim to address the mismatch between demand and supply of labour and increase the well being and employability of the community members (being students, staff, researchers, professors).

Following the reported research results and the needs of the labour market, the EUniWell aim is to start by filling the gap in the following areas:

- **Digital and data literacy**
- **Language skills, Multiculturalism and Inclusion**
- **Sustainability Skills**
- **Soft and Transversal Skills**

Participants to EUniWell microcredentials courses will be entitled to a final digital certification (open badge) recognized by all the EUniWell Universities. These courses are starting in the fall 2022 and will be operational also after the end of the pilot project.

In what follows we provide a short description of the main content of the courses and why we believe those are important also to increase well being.

7.1 Digital and Data Literacy

The pressure to "be digital" has never been greater. According to LinkedIn data, analytical reasoning is one of the most in-demand skills in today's job market. Data literacy involves: knowing how to synthesise data, recognise trends and test hypotheses. This process can provide an analytical framework to go beyond complex business problems and help make informed decisions that benefit the company⁴¹. The microcredential can be comprised of different modules, therefore being attractive to different groups of people with different backgrounds.

7.2 Language skills

English is important all over the world and not only in English-speaking countries. In countries where English is not an official language, more than two thirds of employers require English to work in their business. A [Cambridge](#) analysis reveals that around 85% of international organisations use English as one of their working languages. Over 80% of academic journals are written in English. Schools across Europe have already taken steps to train students for the world of work. Similarly, universities throughout Europe now train students in English. In recent years, there has been an increasing demand for additional language skills. The languages most in demand in the world of work excluding English remain French and Spanish⁴².

An alternative and efficient way of overcoming the language barrier and having an additional skill is Intercomprehension: an ancestral mode of communication in which two people can communicate

⁴¹ <https://online.hbs.edu/blog/post/business-skills-every-professional-needs>

⁴² <https://www.forbes.com/sites/carolinecenizalevine/2021/12/24/these-are-the-three-most-marketable-foreign-languages--how-to-showcase-special-skills/?sh=23fdcc143d28>

by speaking their own language. Today, the term also refers to a new methodology of language learning that allows you to quickly learn to understand several foreign languages of the same linguistic family. Interlocutors speak in their respective mother tongues and are able to understand the language of the other interlocutors by the technique of intercomprehension. Languages derived from the same family language can be easily understood. For example, in Europe there are Intercomprehension between Romance languages and Intercomprehension between Germanic Language courses. Intercomprehension has the added value of also intervening in very important soft skills, fostering diversity, multilingualism, respect of difference and well-being.

Languages as well as intercomprehension courses increase the multiculturalism of our members and the possibility of inclusion. The idea is for EUniWell to enhance teaching skills in intercomprehension and allow students/staff/researchers to learn new ways of interacting with their peers.

7.3 Sustainability skills

Against the backdrop of the turbulence of the years 2020-2022 and the global warming, one sector has emerged stronger than before: sustainability. The green economy will create many new jobs and careers. But the creation of new jobs requires an adaptation of skills. Developing an adequately skilled workforce is crucial to embarking on the path to decarbonisation. According to the [State of Green Business 2021 report by S&P Global and GreenBiz Group](#), more and more employees are required to follow the process towards sustainable development. As mentioned above also leaders are getting more and more interested in ethical and environmental issues.

7.4 Soft and Transversal Skills

Soft skills and Transversal skills are character traits that go beyond knowledge and make it simple to co-work with others in a variety of settings. They are cross-cutting because they may be created and applied to every research field, job, and aspect of personal life. They are closely tied to emotional intelligence and require hard talents as a supplement. These make use of a person's knowledge base, IQ, and task-development abilities. Social skills and the ability to relate to others in a variety of contexts, including the professional one, are associated with soft skills.

Researchers are faced with a wider range of jobs where interdisciplinarity, networking, and collaboration are more crucial than ever. Researchers can work more productively in many job situations if they possess transferable skills, such as excellent communication and problem-solving techniques. While some of these skills are acquired by researchers during their studies, others should be provided by life-long process through specific courses⁴³. The most well-known are listed below:

- Capacity to make decisions with agility and common sense.
- Orientation to problem resolution.
- Optimal interpersonal communication and the capacity to solve conflicts.

⁴³ <https://www.oecd.org/science/transferableskills.htm#TOC>

- Flexibility to adapt to a changing and unpredictable environment.
- Predisposition to work in teams and in a cooperative way.
- Leadership capacity and capacity to motivate others.
- Creativity to find solutions.
- Commitment with the project and responsibility.
- Good prioritisation and management of time.
- Empathy, capacity to listen and to negotiate.
- Work properly under pressure.

7. Conclusions

This report addressed the issue of preparing a portfolio for improving the well-being of society by filling the skill mismatch in the labour market, imagining new courses that help addressing societal challenges, helping young researchers (including PhD) to enter the job market with the right attitude and skills, enhance research collaborations between EUniWell professors as well as the shadow working and sharing of best practices of the EUniWell staff partners.

By encouraging academic exchange and long-term partnerships across disciplines and partners, we propose a new method, as well as new courses (including microcredentials) to build common ground for future research projects that have the potential to push well-being research forward. EUniWell offers a set of tools to facilitate collaboration between academics, be it in education, in research or in engaging with society. These tools are our portfolio.

Part of the portfolio is in “traditional” degree courses (BA and/or Master) on topics which are emerging as “the main ones” of the future and are related to our research Arenas. Indeed the courses currently proposed are the direct follow up of the work of the research Arenas so far.

Another component of the portfolio are specific courses for young researchers and post docs tuned on their characteristics and needs: how to write a research proposal, how to present their work to different typologies of audience etc.

Finally our portfolio includes MOOC and microcredentials on specific topics, identified within the research arenas and that we think will be more effective to help avoiding the mismatch on the labour market.

Perceiving to be in the “wrong” job or with the “wrong” specialisation can create frustration and decrease well-being, which is already challenged by the interaction of the pandemic, the war and other socio political events in Europe and worldwide.

EUniWell has increased awareness on these issues and prepared a set of tools to address them and improve societal well-being.

Appendices

Appendix A: a Survey on skill mismatch

A.1 The Definition

To provide a universal definition of skill mismatch is difficult, since for its intrinsic nature this concept incorporates multidimensional aspects. Starting from an historical perspective, during the 1970s sociologists and researchers across different disciplines point out how decades after the Second World War, we assisted an overall imbalance between workforce skill levels and the ones actually required to fulfil jobs (Halaby 1994; Handel 2003). During that period, indeed, two tangent and contrary processes were witnessed: on the one hand the flourishing of universities and colleges, motivated by an unprecedented growth in the demand for educated and highly trained labour force, which should have been prepared to meet the changes experienced in the industrial mix and production system characterised by “increasingly complex technologies” (Dresch 1975); and on the other a rapid increase of education-intensive industries, which however were not able to maintain the pace of the growing college-educated labour force (Dresch 1975; Smith 1986; Halaby 1994). Indeed, the demand for highly skilled labour force experienced in the 1960s, was not “typical”, but the result of the particular historical conjuncture where “a variety of economic and technological forces, repressed by the Great Depression and the World War II were released in the system” (Dresch 1975). Therefore, the decade between 1970s and 1980s has been marked as the “educational upgrading” of occupations, referring to a situation in which for the first time in the modern history, an increased share of highly educated workers found themselves over-qualified with respect to the job positions they were expected to fill (Clogg and Shockey 1984; Smith 1986), calling for an over-education problem (Freeman 1976), and fuelling a long series of debates and theories questioning even the meaningfulness of education credentials and university paths (Halaby 1994; Handel 2003).

Therefore, in this first phase, skill mismatch was primarily conceptualised as the declining return of education with respect to wage differential. However, from this initial theorisation many debates and academic research followed, furthering the study of this phenomenon from many different angles. In particular, there is a substantial research literature which has studied what is meant by imperfect matching and how this affects productivity, earning, inefficient resource allocations and work satisfaction. Up to recent years, most of the attention has been given to the educational shortages and deficits due to technological shocks, given by the astonishing growth of high-tech industries and companies. Starting from the 1990s, globalisation, the rapid obsolescence of technology, and on the other hand exponential technological progress, together with deep structural changes and the ageing of the workforce, have forced policymakers to focus their resources in skill upgrading and remedial training (Desjardins and Rubenson 2011a). Although these phenomena are still in place, other transformations and other challenges need to be faced in the next few years, first among them climate change. For this reason, deciphering skill mismatch and trying to mitigate its social and economic losses, is of primary importance, and avoiding its exacerbation is fundamental for the European future (European Centre for the Development of Vocational Training 2010).

Nowadays, the OECD (2021) defines skill mismatch as a situation in which the current level of skills of a worker exceeds the ones required for their job (Desjardins and Rubenson 2011b; Adalet

McGowan and Andrews 2015a). Following this reasoning, over-skilled labour force refers to a situation in which workers occupy a position that fails to fully exploit their true potential; conversely, under-skilled labour force reflects a situation in which workers occupy a job position for which they are not up to the mark. This creates two types of inefficiencies: waste of human capital in the former case and operating costs in the latter. Interestingly, this broad definition has key implications, with crucial economic and social repercussions.

Of course, “skill” is a really complex and generic term, for which the lack of reliable data has hampered extensive research and measurement. Most of the recent academic literature has mainly dealt with educational mismatch, while just a few studies have focused on underskilling/overskilling disequilibria in the market (McGuinness, Pouliakas, and Redmond 2017). Although education and skills may be significantly related, they cannot be used as synonymous, nor can education and qualification. As pointed out by OECD (2013), educational levels may be considered proxies for several skill categories, but it is equally true that within each broad educational classification there is significant variance in skills and ability levels. Understanding the proper terminology and the distinguishing features and dimensions of each type of mismatch is crucial to help policy makers and universities activate virtuous cycles that may help to address mismatches and arrange targeted interventions. Following the OECD (2017) skills can incorporate two broad universes: i) cognitive abilities which involve literacy, numeracy and the ability to understand and solve abstract problems; ii) and non-cognitive abilities, which concern the social and emotional sphere; as well as those that refers to the physical characteristics, crucial to carry out specific tasks, occupations, suitable for a specific job or sector.

According to Quintini (2011) the imperfections registered in the labour market – wage frictions, asymmetric information and rigid workers’ mobility – generate several different types of skill imbalances, which reflect the existent gap between personal workers’ abilities and jobs’ requirements, e.g. skill shortages, skill mismatch and qualification mismatch. Following Kriechel and Vetter (2019), the different types of skill mismatches can then be conceptualised in a dimensional framework. Specifically, the dimensions of skill mismatch may be vertical, representing a situation of overeducation (overqualification/overskilling) – or on the contrary a situation of undereducation (under-qualification/under-skilling) – meaning that the worker’s abilities may exceed (or may fail) the requirements to fulfil the job position (European Centre for the Development of Vocational Training 2010); or horizontal, occurring when the education (qualification) may be sufficient, but there is a discrepancy between fields required and fields hired (European Centre for the Development of Vocational Training 2010); or geographical, where the required skills or education are concentrated in a region different from where such levels of capacity are desired.

Moreover, the analysis of mismatch can be approached with two different perspectives: at the micro level, by measuring skill mismatch for individuals; and at the macro level, by investigating firm-level aggregate dynamics (McGuinness, Pouliakas, and Redmond 2017). Therefore, depending of the particular definition of mismatch employed, its measurements and also its potential consequences may vary. Moreover, some of the above-mentioned mismatches can be experienced independently by the employees, or by the employers, and they can be measured independently in a subjective way or by employing existing data sources.

Following the insights proposed by European Centre for the Development of Vocational Training (2010), hereafter we report Figure 19, which summarises the main definitions of mismatch found in the literature.

Overeducation	A situation in which an individual has more education than the current job requires (measured in years).
Undereducation	A situation in which an individual has less education than the current job requires (measured in years).
Overqualification	A situation in which an individual has a higher qualification than the current job requires.
Underqualification	A situation in which an individual has a lower qualification than the current job requires.
Overskilling	A situation in which an individual is not able to fully utilise his or her skills and abilities in the current job.
Underskilling	A situation in which an individual lacks the skills and abilities necessary to perform on the current job to acceptable standards.
Credentialism	A situation in which the level of education required to obtain the job exceeds the level of education required to perform the job adequately. It relies upon a belief of the employer that the possession of certificates and diplomas implies higher productivity on the part of the individual.
Real overeducation	A situation in which an individual possesses more education than the current job requires and also in which current skills and abilities are underutilised.
Formal overeducation	A situation in which an individual possesses more education than the current job requires, but in which current skills and abilities are fully utilised.
Genuine overeducation	A situation in which an individual has more education than the current job requires and this state has a negative effect on the level of job satisfaction.
Apparent overeducation	A situation in which an individual has more education than the current job requires, but this does not adversely affect the level of job satisfaction.
Skill shortage	A situation in which the demand for a particular type of skill exceeds the supply of available people with that skill.
Skill surplus	A situation in which the supply of available people with a particular skill exceeds the demand for it.
Skill gap	A situation in which the level of skills of the currently employed is less than that required to perform the job adequately or the type of skill does not match the requirements of the job.
Economic skills obsolescence	A situation in which skills previously utilised in a job are no longer required or have diminished in importance.
Physical (technical) obsolescence	Physical or mental skills and abilities deteriorate due to atrophy or wear and tear.
Vertical mismatch	A situation in which the level of education or skills is less or more than the required level of education or skills.
Horizontal mismatch	A situation in which the level of education or skills matches job requirements, but the type of education or skills is inappropriate for the current job.
Subjective measures of mismatch	The mismatch estimate is obtained by self assessment in employee responses to a questionnaire.
Objective measures of mismatch	The mismatch estimate is obtained by evaluating job requirements.
The empirical mismatch method	The mismatch estimate is derived from differences in the actual education of an individual within an occupation relative to the mean or modal level of education of all people employed in that occupation (where there are no direct data on mismatch obtained from either of the above methods).
Crowding out/ bumping down	When better qualified workers are hired to do jobs that less qualified workers could also do, they are crowding out the less qualified workers from what would be their traditional employment possibilities for that level of skill. Bumping down refers to the fact that this process works from the top to the bottom and pushes the less qualified workers to even lower level jobs. At the extreme some lower level workers may lose employment altogether when crowding out occurs.

Figure 19 Glossary of Terms — Source: (Development of Vocational Training 2010)

A.2 The Measurement

As mentioned above, the notion of mismatch has been approached in the literature with two different perspectives: at a macro and micro level. At a macro level, mismatch occurs whenever there exists a reallocation of workers to jobs, which may improve the general equilibrium in the market, both in terms of employment or aggregate output (Pellizzari and Fichen 2017; McGuinness, Pouliakas, and Redmond 2017). Looking at the aggregate, we lose the information related to the single job-worker pair mismatch, focusing on the composite distribution of workers' and jobs' characteristics (Pellizzari and Fichen 2017). The micro level perspective, on the other hand, specifically analyses the single pair of workers and jobs, comparing skills or qualifications with those required by the specific job.

The measures of mismatch linked to the firm-level aggregates are usually related to the study of skills gaps, workers not possessing the abilities/competences to perform their roles, or skills shortages, due to hard-to-fill job positions caused by a lack of suitable qualified candidates. These two mismatches are often associated with firms' productivity and profitability issues, since at a macro-level competitiveness may exacerbate inadequate skill mismatches, deteriorating firms' economic performances (McGuinness, Pouliakas, and Redmond 2017). The macroeconomic indicators usually exploited by this kind of approach rely on the differences registered in employment rates across different skill groups (Zanker et al. 2015). However, analysing the level of employment per educational group may be a biased strategy, since this method fails to consider the systematic differences which occur between groups, education systems, cultural backgrounds and contexts (Zanker et al. 2015). Other measures look at unemployment or vacancies to broad qualification levels in the labour market (Kriechel and Vetter 2019). This macro-perspective usually exploits the Beveridge Curve to identify the coexistence of job vacancies rate (JVR)⁴⁴ and unemployment rate⁴⁵, as a reference of potential skill mismatch. The negative relationship between unemployment and job vacancies reflects the fluctuations recorded during the period of economic expansions, in which there are more vacancies and a low level of unemployment, and economic contractions, in which on the contrary, there are less vacancies and high unemployment. The Beveridge curve can be shifted outward or inward depending on the potential structural changes recorded in the economy. Therefore, to some extent it can be considered a barometer of the functioning and efficiency of the labour market. This is perfectly shown in Figure 20, where it is possible to observe both for the EU27 and for the euro area (19 countries) how during the worldwide recession of 2008-2009 and for the first quarter of 2020 (when Covid-19 started to hit), we assist to a significant increase in terms of unemployment rate and a considerable drop in terms of job vacancies. However, the empirical interpretation of the curve and its movement can be challenging for several reasons, one among them the fact that the movements along the curve and the shift can take place at the same time, making it difficult to disentangle each driver.

⁴⁴ defined as "paid post that is newly created, uncopied, or about to become vacant". The JVR is calculated as the number of job vacancies/ (number of occupied posts+ number of job vacancies) *100, Eurostat.

⁴⁵ unemployment rate is the number of people unemployed as a percentage of the labour force, defining an unemployment person, according to the guidelines of the International Labour Organization, Eurostat.

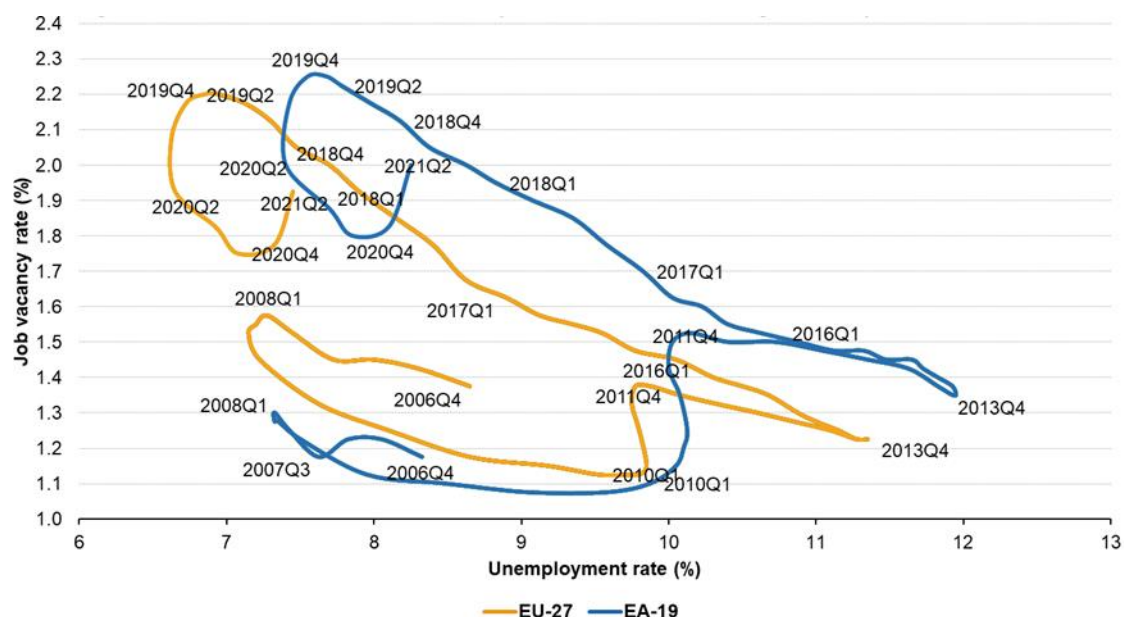


Figure 20 Job vacancy and unemployment rates - Beveridge curve — Source: (Eurostat 2022)

Moreover, these proposed indicators suffer from the fact that unemployment levels are influenced by many different factors, besides skill mismatch. It is extremely difficult to disentangle each determinant, understanding the exact contribution of mismatch to the total level of unemployment.

Therefore, the majority of research on skill mismatch has focused on the micro-level perspective, specifically inspecting the degree of skill mismatch, measured as surplus or deficit of human capital (McGuinness, Pouliakas, and Redmond 2017). The micro notion of skill mismatch refers to “each single pair of workers and jobs”, but its theoretical foundations are less sound with respect to the macro-level theorising (Pellizzari and Fichen 2017). Indeed, the individual level analysis of skill mismatch has been exclusively an empirical topic, with the associated problems of data quality, measurements and external validity issues due to the lack of a formal, universally and uniquely accepted definition of skill mismatch (Pellizzari and Fichen 2017). Having accurate and precise data on each particular dimension of skill mismatch is almost impossible. First of all, for measurement issues linked to the qualitative nature of some of the skill dimensions; second of all, educational and qualification outcomes do not necessarily translate into a certain level of skill attainments and vice versa; and, finally, skill mismatch may be extremely context- and cultural-specific.

Two main methods to account for skill mismatch have been proposed: a subjective and an objective measure. The subjective method relies on self-assessment about the individual perceived level of adequacy in terms of skills/abilities and competencies with respect to the position they fulfil. Several self-rating measures to calculate the degree of skill mismatch, considering different categories, which range from the higher educational study level completed, to the extent to which the respondent feels that his skills are being fully or partially utilised for the current job position (Allen and Van der Velden 2001) have been proposed. These self-reported measurements can be: i) “direct self-assessment” (DSA), for which respondents are directly asked to subjectively evaluate whether their education/qualification level is over- or under- their job position; ii) or “indirect self-assessment” (ISA), for which, instead, respondents have to subjectively assess which should be the “right” educational/qualification level for the job. In the OECD’s Survey of Adult Skills (PIAAC) dataset, respondents are asked to convey what level of education would be appropriate to carry out their mention. In this way, a binary variable is collected to measure subjective over-education, which

captures overeducation to accomplish the job duties or surplus in terms of entry requirements. The main advantage of the self-assessment approach is that it can take the heterogeneity of jobs into account, but self-reported measures suffer from intrinsic biases due to subjectivity issues and by “the exact wording of the questions” used to collect the data (ILO 2018). Moreover, there is no uniform guideline to the implementation of the subjective approach, leading to problems of comparability for cross-country analysis (McGuinness, Pouliakas, and Redmond 2017). Measuring skills and abilities between workers and jobs is not an easy task since most databases just cover literacy and numeracy capacity and only a few contain information on skills and abilities (and degree of satisfaction and matched between what is learned and what is needed). Therefore, most of the existing academic and policy studies have focused on education/qualification mismatch, built on objective information typically retrieved from competency tests, job analysis or educational/qualification certificates. (Bischof 2021; European Centre for the Development of Vocational Training 2010). Indeed, apart from the self-declared approach, other two methods have been retried on the literature to measure educational and qualification mismatch: the normative and the statistical approach (Verhaest and Omeij 2006; Quintini 2011; Desjardins and Rubenson 2011b; McGuinness, Pouliakas, and Redmond 2017).

The normative method, also known as the job analysis (JA) approach, pins the required level of education to the occupational classification of job analysis. The job evaluation method has contributed to the creation of occupational dictionaries, which report the educational requirements needed for pursuing a specific occupation, such as the Dictionary of Occupational Titles (DOT), or O*NET in United States or Standard Occupation Classification (SOC) in the United Kingdom; other sources which are framed similarly are the International Standard Classification of Occupations (ISCO), which categorise the major occupational cohorts by level of educations, following the International Standard Classification of Education (ISCED). The main advantage of this approach relies on the fact that it is perceived as more reliable and scientific, basing on field expertise, limiting the level of distortions occurring in self-assessment measures. However, the JA method presumes a “a priori” correspondence between occupational classification and education/qualification levels, assuming that such correspondence holds in all countries and in all contexts. Nevertheless, larger differences may exist. If the classification is not adjusted in time - technological progress may change the content and the complexity of jobs - as well as in space - labour market are country and culturally specific (Verhaest and Omeij 2006; Quintini 2011; Desjardins and Rubenson 2011b), the mismatch measurement may result distorted and outdated. Moreover, this approach may also be biased by the subjectivity of the opinions of the experts, invalidating the purported semblance of objectivity (McGuinness, Pouliakas, and Redmond 2017).

Finally, the statistical or empirical approach, also known as the realised matches (RM), typically depends on the distribution of education attainment calculated for each occupation group who departs from the mean to determine the required level of education for each specific job. The main advantage of this method relies on its relatively easy applicability, given the existing micro-datasets containing information on both education attainment and occupation, like the national labour force surveys, with important implications for potential cross-countries comparisons. Notwithstanding the relative availability of this kind of data, which makes this approach particularly appealing, this method has been widely criticised. Indeed, the resulting skill mismatch measurement mainly reflects the average credentials of all workers within a specific occupation and not the actual skills/abilities requirements for a particular job. Moreover, lacking granularity in the data, usually this approach refers to educational levels which involve the broad occupational groups,

incorporating within the same categories a large variance of individuals with different job titles, creating biases and distortions. Furthermore, another important drawback lies in the fact that the occupational averages may be biased by the majority of older workers, reflecting the historical entry requirements more than the potential changes in job skill requirements for new workers' groups, resulting again in a potentially outdated measurement (McGuinness, Pouliakas, and Redmond 2017).

In summary, measuring skill mismatch is very complex, and each measurement has strengths and drawbacks. Therefore, the best analysis that can be given to study this phenomenon is the combination of the various approaches. What is crucial to be noted, however, is that skill mismatch is not a permanent phenomenon. As pointed out by (Mauriès 2016) skills mismatch should be considered as a temporary and fluid phenomenon. A worker which is perceived by the system as mismatched at time 0, with the right interventions/training may become well-matched at time $t+1$ (Mauriès 2016)⁴⁶. This means that the measurement of this mismatch is still a partial snapshot of an ever-changing phenomenon. Understanding its causes and determinants is crucial to understand which actions the different actors involved must activate from time to time to govern the phenomenon and not be overwhelmed by it.

A.3 The (many) Causes

As reported in detail by Quintini (2011), just a handful of empirical studies have enquired about the causes of mismatch. The lack of suitable and reliable cross-country data is the main factor which has made it difficult to identify the potential drivers of skill mismatch. There is not a unified theory of education or skill mismatch, however, as indicated by Desjardins and Rubenson (2011b), there are a number of theories which shed light on the labour market imperfections. There is a broad range of potential explanatory factors, but the main skill mismatch can be traced back to frictional, cyclical and structural causes.

Frictions in the labour markets are usually connected with the high costs associated in finding the right job given a worker's set of qualifications/abilities/educational levels, but also with inefficiencies due to market regulations and job mobility issues. Cyclical drivers, instead, depend on the economic conjunctions that can result in recessions, causing firms to worsen productivity, profitable margins and attractiveness towards appropriately skilled workers. During economic expansions, typically, skill mismatch and labour shortages increase significantly. Indeed, in these phases, firms are usually forced to rapidly retrieve the "right" skills to fill the new positions available on the labour market. Accordingly, the share of firms that have reported missing skills as one of the major impediments of hiring new applicants has constantly increased in recent years, from 37% in 2016 to 41% and 47% in 2017 and 2018, respectively (European Investment Bank (EIB) 2018).

⁴⁶ For instance, microcredentials or MOOC could be used to "fill the gap". These can be organised in a relatively short time and be readily used. The debate is very lively within the European University Alliances, since they aim at providing the right skills.

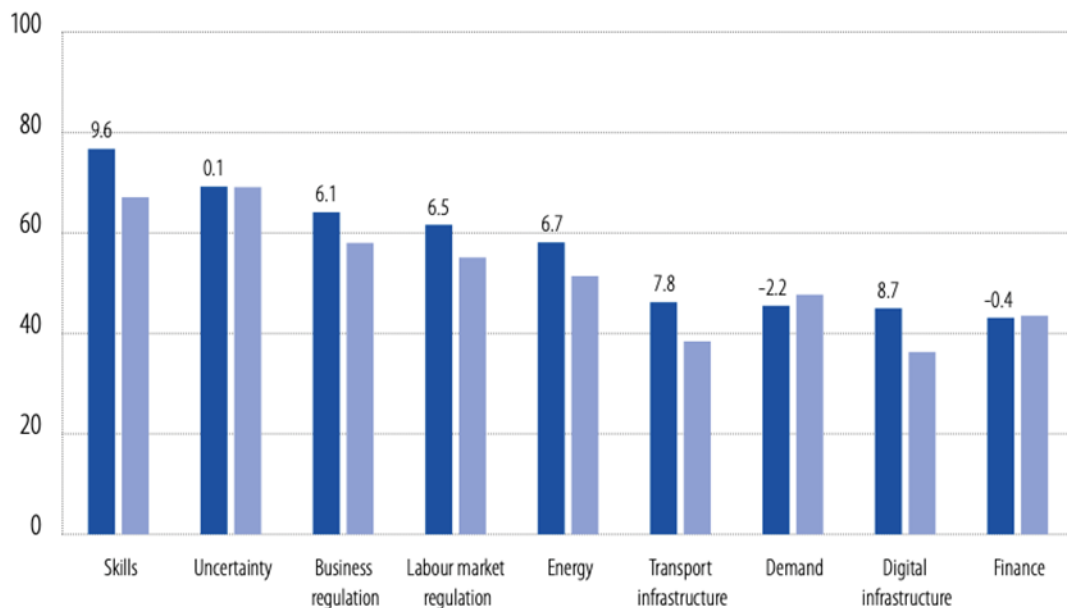


Figure 21 Limited availability of skills as an investment impediment — Source: (European Investment Bank (EIB) 2018)

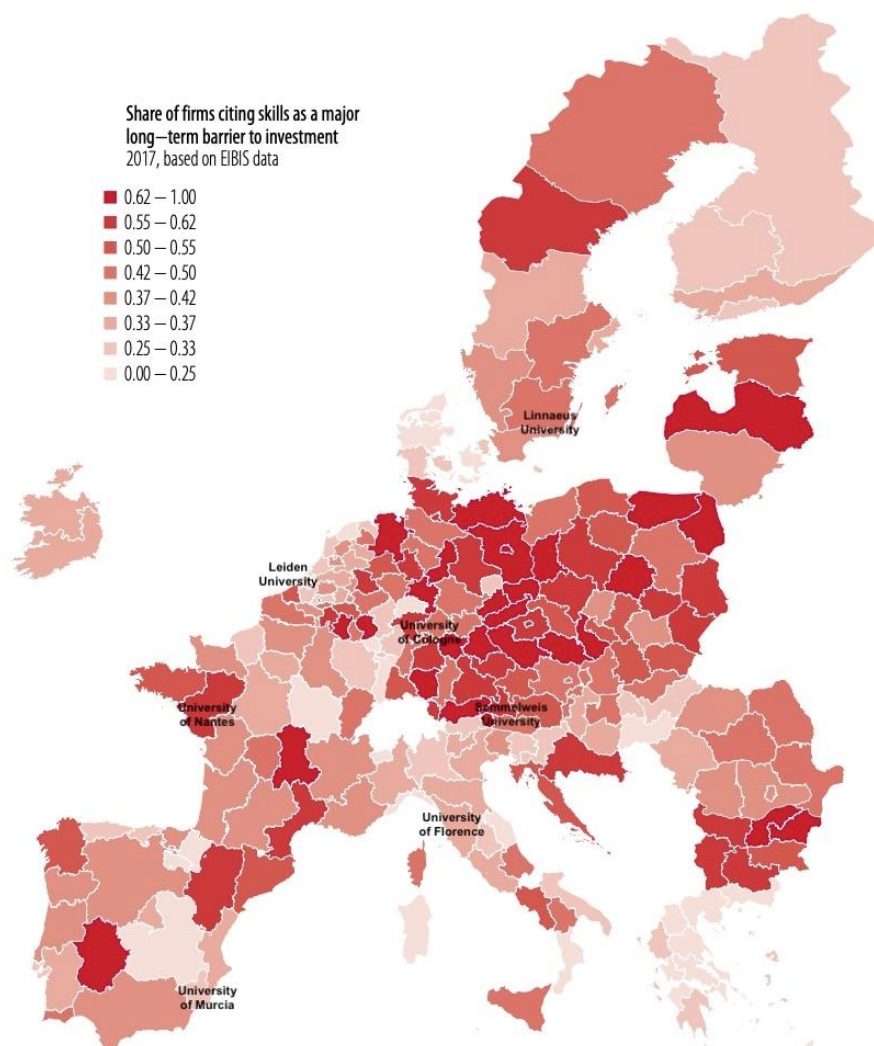


Figure 22 Share of firms citing missing skills as a major long-term barrier to investment — Source: European Investment Bank (EIB)

The promptness with which labour supply is able to respond to the rise in the labour demand is strictly interconnected with the distribution of skills, geographical mobility of workers and wage adjustment in the labour market.

Finally, structural changes result in a misalignment between the aggregate distribution of workers' abilities and skills and the aggregate distribution of job requirements to fill vacant positions (Nedelkoska and Neffke 2019; European Centre for the Development of Vocational Training 2010; Quintini 2011). The structural causes can originate from external and internal shocks, such as technological progress, trade shocks, institutional policies and demographic changes, which can alter labour market equilibria. In particular, structural changes can be considered from a demand or supply perspective.

The factors that can shape the supply side of skills over time are usually associated with institutional changes, and in particular educational policies. From the beginning, in the academic literature this issue has been studied by looking at the problem of over-skilled workforce and the returns of education. Starting with the seminal work of (Freeman 1976), the skill mismatch has principally focused on the rate of return of investing in education. As reported extensively by (Goldin and Katz 2007), from 1920 to the 1950s, the wage structure in the United States has continuously registered a considerable narrowing, drawing attention to an unprecedented mechanism: the reduced relative earning margins of the more educated labour force with respect to the less educated one. Indeed, this phenomenon was the result of the significant decrease in the return to years of schooling recorded between 1915 and 1950.

Although up to the early 1970s each generation of Americans has reached a higher level of education with respect to the preceding one, the productivity level did not continue to advance at the rate it once experienced. The "American dream" of upward mobility with regard to education began to creak from the 1970s onwards, due to the constant and continuous decline in the college premium with respect to high-school education. Indeed, as described by (Goldin and Katz 2007), the twentieth century has experienced two diverging inequality tales, one declining – college wage – and one rising – high school wage premium. As a result, what has been detected is that the wage premium of college graduates over high school graduates tends to be higher when the supply of college degrees is relatively modest and lower when the supply is high. This mechanism is not surprising. Indeed, it properly mirrors the economic concept of scarcity of resources. If the supply of degrees is low, then the economic value associated with a college degree will be higher, since it would be more difficult to find a highly qualified worker in the labour market. The contrary is true when, due to an overabundance of highly skilled prospective workers, a firm encounters more difficulty in hiring a less skilled worker. This process is obviously reflected in the earnings prospects, explaining changes in the skill premium. As pointed out by (Goldin and Katz 2007) the discontinuities detected in the wage structure and in the returns to education suggest the importance of supply changes "and education changes are by far the most important on the supply side".

From the demand side perspective, instead, structural changes are usually connected with technological and innovation shocks. Indeed, skill obsolescence, along with skill shortages, are the results of the rapid depreciation of technical/manual skills occurring due to the changes experienced in the production of technology (Allen and Van der Velden 2001; European Centre for the Development of Vocational Training 2010). The drastic or progressive technological upgrades

necessarily induce firms to modify their production, forcing them to alter the set of skills required to fill a particular job position. To cope with the product's or technology's life cycle changes, firms need to adapt their optimal input mix in order to survive in the market (European Centre for the Development of Vocational Training 2010). Consequently, during this transition and adjustment period, two contemporaneous phenomena occur. The first one regards the rapid obsolescence of existing skills, which may determine that the more mature workforce, which is more anchored to the previous technology, is the one more exposed to human capital depreciation and to the risk of losing its job (De Grip, Van Loo, and Mayhew 2002). This usually translates in rising unemployment levels and crowding out of lower-skilled workers in the economic system, with the consequent problems associated with them (European Centre for the Development of Vocational Training 2010). The second phenomenon is the one of skill shortages, namely a situation in which employers are not able to recruit sufficiently trained workforce at the ongoing rate of pay Quintini (2011), corresponding to the first phase of the business cycle itself (European Centre for the Development of Vocational Training 2010). The reasons linked to skill shortages are complex and influenced by several factors. Information gaps, perceived high costs of education, coupled with perceived low returns, inadequate educational provision and training courses by universities and firms are usually considered the critical drivers of the insufficient labour-market mobility and unavailability of suitable skills (Neugart and Schömann 2002).

In this regard, the relationship between skill and technological change deeply connects with the central theme of the transmission of knowledge and know-how in the economic system. Indeed, as pointed out by Vona and Consoli (2015) and Nedelkoska and Neffke (2019), a crucial aspect that should be taken into account is the actual life-cycle to which the introduction of a new product, innovation or technology corresponds. Understanding the mechanisms underlying this process is critical to detect when and how skill mismatch occurs and to activate the proper interventions to face it. In fact, although at its initial phase the introduction of a technology may require an urgent need for a capable and newly trained workforce, gradually the production processes, as well as the workforce and the technology, mature, leading to an optimisation of firms' resources. Therefore, the marginal gains derived from increased specialisation are very high at first, but progressively and above a certain point the margins diminish, and the tasks rapidly become sufficiently standardised to be performed even by an unskilled workforce (Nedelkoska and Neffke 2019). This process contributes to explain the labour market trends experienced in recent years, namely the growth of the demand for low-skilled and high-skilled labour force, relative to the middle-skilled workforce (IMF 2017). Indeed, as shown in the following Figure 23, Cedefop (2018) illustrates how strong job creation is expected for professionals, technicians, and for occupations which require on average lower level of qualification, shop and market sales workers. This phenomenon is known in the literature as job polarisation (Graetz and Michaels 2015; Gregory, Salomons, and Zierahn 2016).

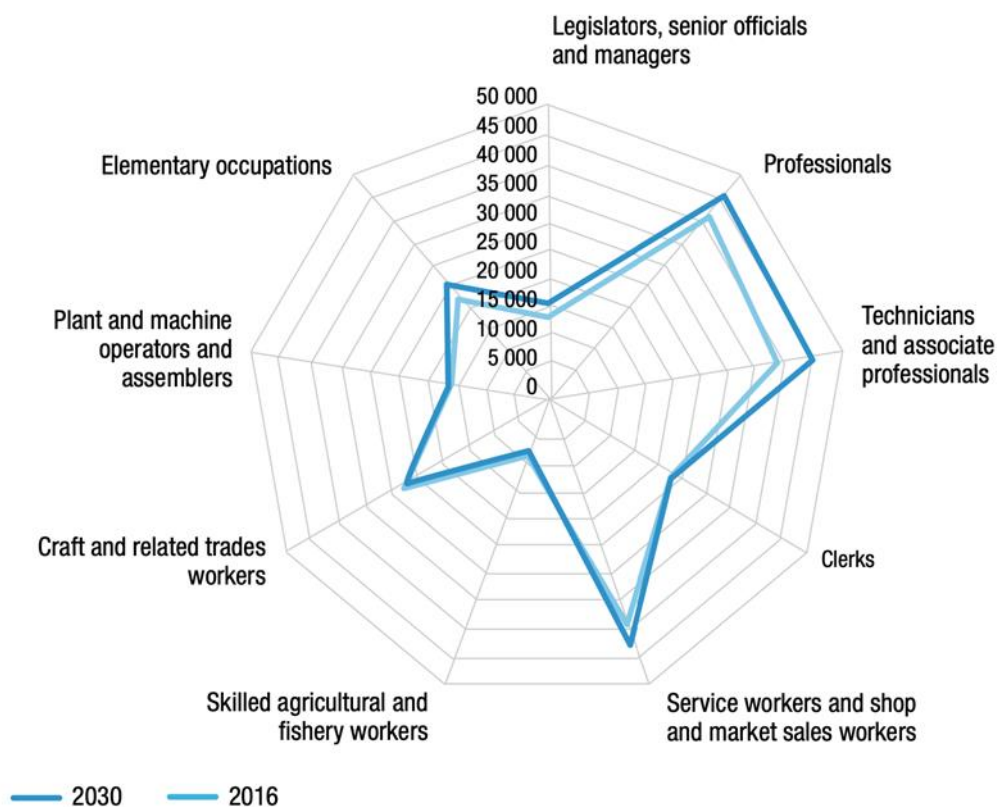


Figure 23 Occupational Structure of Employment – Source: (Cedefop 2018)

Automation, information, communication technologies, as well as software and industrial robots, affect the demand for workers, and contribute “to distinguish between technologies that are used by humans as opposed to those that replace them” (Blanas, Gancia, and Lee 2019). In this perspective trade and globalisation are important drivers of this process, along with automation processes, and the connected risks of outsourcing and offshoring (Nedelkoska and Neffke 2019). Academic literature has pointed out how these various types of machines have contributed to the displacement of workers, especially in sectors where automation is more widespread, like manufacturing (Acemoglu and Restrepo 2020; Acemoglu, Lelarge, and Restrepo 2020). Therefore, the “risk of automation” has recently been calculated, in order to single out the occupations which are more exposed to see a significant share of their tasks be automated. Hereafter, we show the results of the automation risk for occupations in EU27 over the period 2020-2030, by occupation proposed by CEDEFOP and the automation risk for selected countries, retrieved from (Nedelkoska and Quintini 2018).

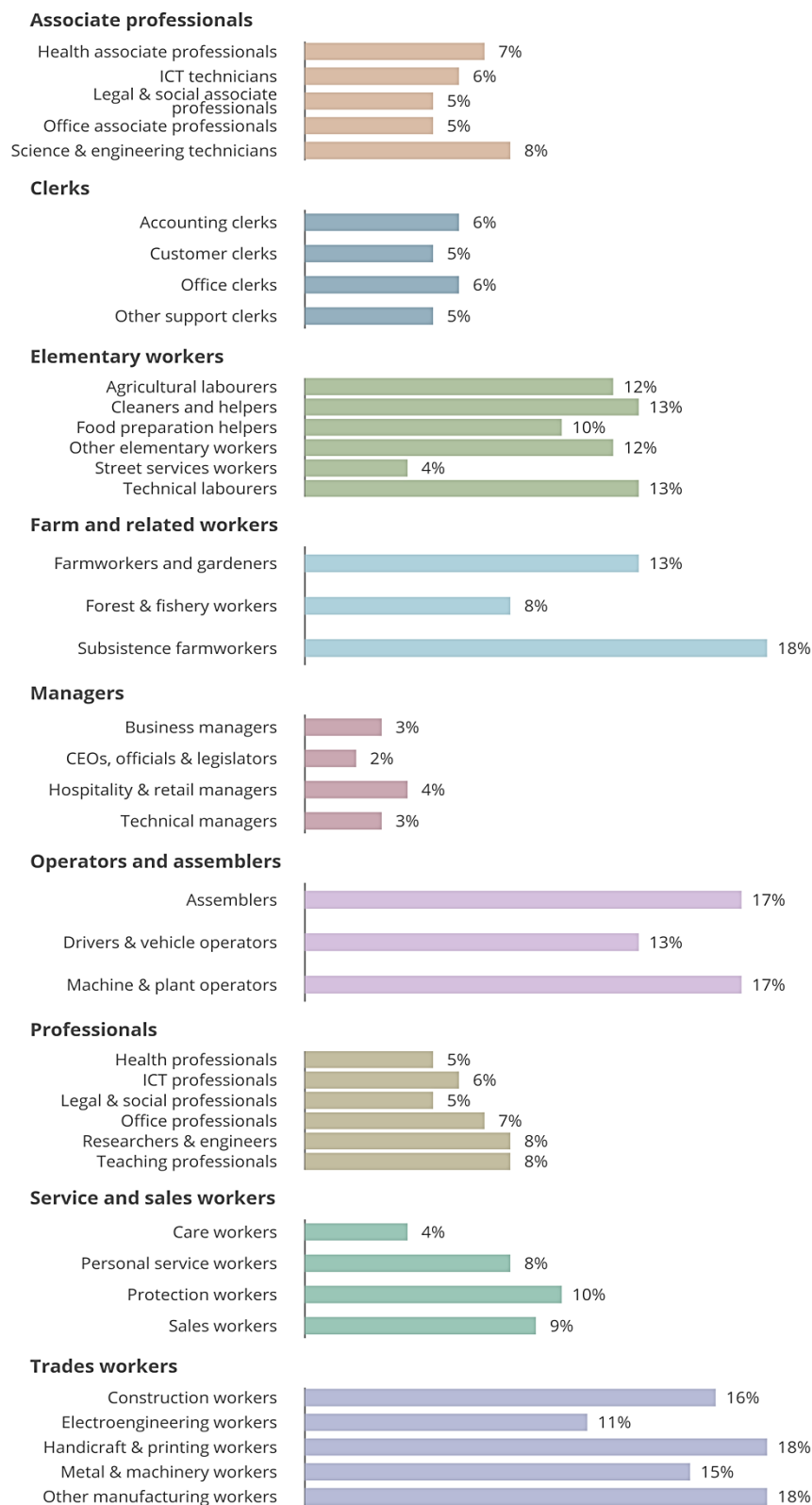


Figure 24 Share of Employees in EU27 with high automation risk in 2020-2030 by occupation
— Source: CEDEFOP

Although the introduction of these new technologies has been found to have detrimental effects on specific types of workers and on the employment level (*D. H. Autor, Levy, and Murnane 2003; H. Autor and Dorn 2013; Acemoglu and Restrepo 2020*), several studies have noticed how industrial robots actually benefit the total employment level and certain types of workers cohorts (*Klenert, Fernandez-Macias, and Antón 2020; Autor David and Salomons 2017; Graetz and Michaels 2018*). In that perspective, the introduction of these innovations are considered as labour-saving, and they are shown not to be drivers of displacement, but instead drivers of tasks restructuring (*Acemoglu and Autor 2011; Tolan et al. 2020; Klenert, Fernandez-Macias, and Antón 2020; Zanker et al. 2015*). In this sense the distinction between tasks and skills is fundamental (*Acemoglu and Autor 2011; H. Autor and Dorn 2013; Nedelkoska and Neffke 2019*). Indeed, tasks are characteristics of jobs, or they can be also considered as units of work activity to produce the final output; while skills are characteristics associated with workers. Therefore, when workers increase their level of skills, they are actually acquiring a comparative advantage in certain tasks for obtaining a particular job position. The task-based approach makes the picture far more complex, not simply dividing high- and low-skill labour force, but also by categorising jobs according to the sophistication of tasks: routine, non-routine, interactive, manual and cognitive. In this perspective, different level of skills correspond to different comparative advantages to perform specific tasks: low-skilled workers have a comparative advantage in performing manual tasks, middle-skilled workers in routine-tasks, while high-skilled workers have a comparative advantage in performing the so called abstract or cognitive tasks (*Nedelkoska and Neffke 2019*). In this perspective, indicators which analyse the importance of the various tasks for each occupation at the 2-digit ISCO code level have been introduced, using an index which ranges from 0 to 1.

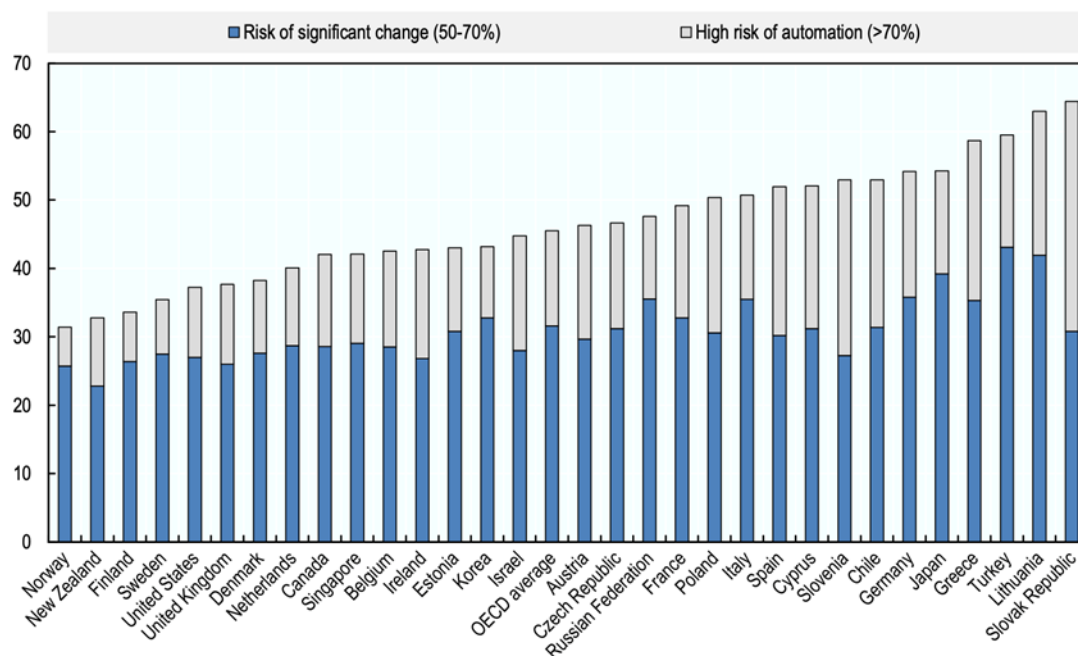


Figure 25 Cross-country variation in job automatability, %age of jobs at risk by degree of risk – Source:(Nedelkoska and Quintini 2018)

Of course, the incidence of skill shortages, skill-obsolescence, and more in general skill mismatch reflect the economy’s position in the business cycle and the efficient role played by the institutional

settings. Indeed, the institutional framework regulates the labour market equilibrium and it influences the speed at which firms and universities are able to cope and adapt with the shock linked with the introduction of technological or innovation changes. The education system, the degree of coordination in wage bargaining, union density, labour market policies, as well as employment protection regulation and international competition, play a crucial role in determining the severity of the skill mismatch and in explaining the recorded variance across countries and over time Quintini (2011). Reducing policy-induced distortions to the labour market along with a more responsive, efficient and context specific institutional framework are key priorities to face skill mismatch issues (Adalet McGowan and Andrews 2015b).

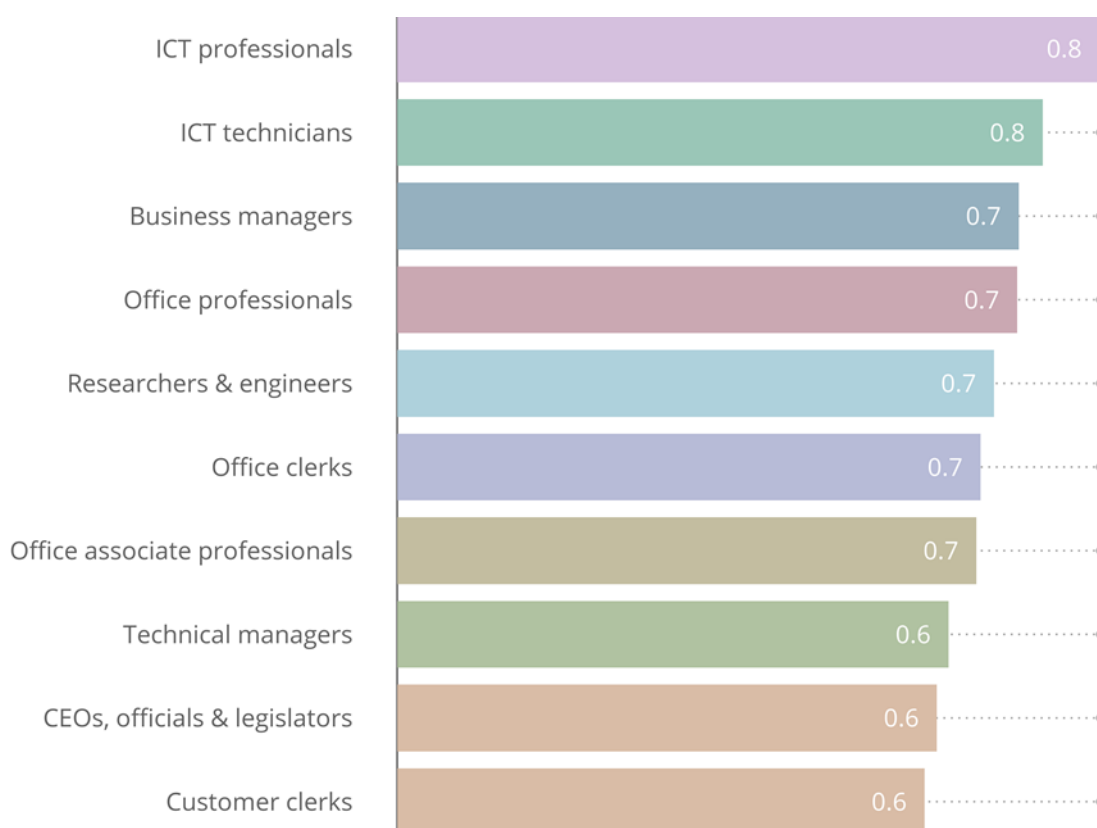


Figure 26 Top occupations in EU for Use of ICT in Use of technology — Source: CEDEFOP

Appendix B. EUniWell is expanding: the University of Murcia

The University of Murcia is the eighth member of the EUniWell network. It is one of the oldest universities of the EUniWell consortium, dating its origin back to the thirteen century. It offers a multidisciplinary range of courses provided by 21 distinct faculties, involving more than 32,000 students. By inspecting the OECD data on "the Skills for Jobs", we can see that in line with the national/regional situations of the other Universities of the EUniWell consortium, Spain suffers from similar skill shortages. As for the case of France, Germany and the Netherlands, there are no regional data and we can compare only the national average with the European one. Generally, the Spanish situation underpins a shortage of skills across the entire spectrum, with a few areas lagging far behind the European average and only a small subset of abilities, i.e. technical skills, resource management skills and social skills almost aligned with the EU job market (see Figure 27).



Figure 27 Spain skill gap with respect to Europe

In order to have a more refined look into the statistics regarding the University of Murcia, we can rely on official reports released by the University. In particular, by inspecting job market outcomes for graduates in courses taught in English (as well as on a report for graduates in Comparative European Literature), we can assess the performance of a selection of faculties, keeping in mind that Spain is characterized by a large youth unemployment (much worse than any other EU country considered). Graduates in courses taught in English seem to be on average employed in the same field as their

studies, even if a substantial portion (almost 20%) of graduates is employed in a sector that is completely unrelated with their university career. It seems that there aren't significant differences between men and women, also with respect to the sector of employment: three quarters of the graduates from this particular path are indeed employed in education (73% of women, and 75% of men)⁴⁷.

The information related to the Master in Comparative European Literature provides a glimpse into some of the difficulties encountered by humanities graduates in the Spanish labour market. Indeed, it appears that after completing the Master, only 65% of graduates is employed, of which over 35% are in further university education. The rate of unemployment suggests that the situation is alarming, with over 35% declaring not to be working. It is thus not surprising to see that students' satisfaction with respect to job placement is very low, totalling on average 2.5 points on a scale from 1 to 5. Moreover, and in accordance to the modal profession being PhD students, the net monthly salary of employed graduates is on average less than 1300 euros⁴⁸.

	Mujer		Hombre		Total	
	n	%	n	%	n	%
Totalmente relacionado	41	70.7	14	60.9	55	67.9
Bastante relacionado	4	6.9	4	17.4	8	9.9
Algo relacionado	4	6.9	1	4.3	5	6.2
Nada relacionado	9	15.5	4	17.4	13	16.0
Total	58	100	23	100	81	100

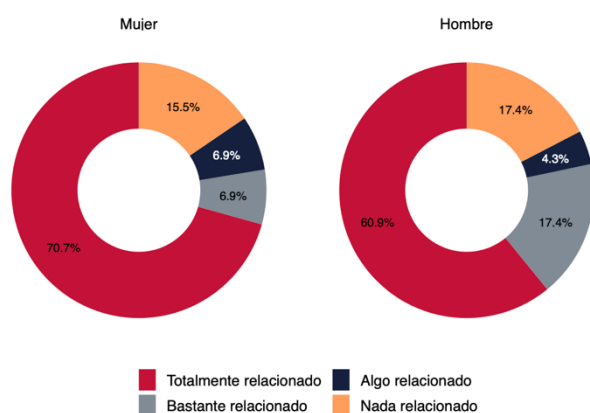


Figure 28 Relationship between job and education

⁴⁷ <http://observatorio.um.es> "La Inserción laboral de los titulados de la Universidad de Murcia", 2019

⁴⁸ Servicio de Orientación y Empleo (COIE) Observatorio de Empleo
Noviembre, 2021

These reports are extremely useful to have specific information about the performances of each faculty and help understanding how different university path can be improved to provide the right skills requested by a static labour market. The focus on faculties belonging to humanities, makes it difficult to assess the job market performance of the University of Murcia in its entirety; it is expected, indeed, that STEM faculties would fare better in terms of employment and salary prospects, in line with the European average. Nonetheless, it remains crucial to highlight the pluses and shortcomings of each faculty.

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