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European Expert Network on Economics of Education

Literature review on the provision of digital skills for adults

Analytical Report 01/2022

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ABOUT EENEE

EENEE is an advisory network of experts working on economics of education and training. The establishment of the network was initiated by the European Commission's Directorate-General for Education and Culture and is funded by the Erasmus+ Programme. PPMI is responsible for the coordination of the EENEE network. More information on EENEE and its deliverables can be found on the network's website www.eenee.eu. For any inquiries, please contact us at: eenee@ppmi.lt.

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Executive summary

Background and scope

The development of digital skills and competences has become a prominent theme in policy discourse and research over the past decade, given the rapid technological advances and penetration of technology in every sphere of life. This trend has recently accelerated as the COVID-19 pandemic pushed policymakers and practitioners to set up and provide remote learning at all levels of education and training. Moreover, the pandemic and the related need to work remotely have also incentivised many adults to reflect upon and act to improve their digital skills. Similarly, there has been a growing focus on upskilling and training aimed at aligning labour markets with the rapid transformation of global economies.

This report has been prepared for DG EAC to provide a focused review of the literature published since 2018 on the provision of digital skills to adults in Europe. The review looks at the **provision of medium-level digital skills** by taking into consideration courses or programmes that are either work-based or provided in a non-formal and informal context and are targeted at adults of working age. The analysis focuses on understanding what aspects are addressed by policies relating to the development of digital skills among adults, what thematic areas and target groups are covered by the existing provision of digital skills, and how current provision addresses the needs identified.

Literature on adults' digital skills is rich, but evidence analysing the provision of digital skills for adults is limited. While the number of papers published is substantial and growing, their utility for policy-relevant analysis is somewhat limited. Most of the available literature is concerned with the digitalisation of learning, the assessment of digital skills and their conceptualisation. A small number of papers examine specific policies and modes of provision; however, the related findings do not lead to policy-relevant conclusions. The lack of such research and literature indicates an alarming gap, given both the importance of the issue and the growing amount of public and private funding spent on designing education programmes aimed at upskilling and reskilling adults.

Key findings

Key message 1. There is a great deal of **heterogeneity among countries** in terms of both the stage of digitalisation and the number and comprehensiveness of policies addressing digital education and skills:

- The majority of Member States **integrate the oversight of strategic policies** targeting the provision of digital skills for adults **into the same ministry that has institutional responsibilities for overall education policy** (i.e. the Ministry of Education), though there are a number of initiatives led by various other ministries (Ministry of Social Affairs, Ministry of the Economy, etc). Policies themselves are usually articulated through **generic strategic documents on digitalisation,** even though countries are **increasingly developing specific digital skills strategies for adults** (or other target groups).
- **Individuals are most often targeted as both citizens or workers,** with governments being concerned about equipping them with the skills needed for societal and economic transformations. Policies pay particular attention to the **inclusion of those lacking digital skills, as well as taking into consideration intersecting inequalities** (such as the gender divide).
- Education pathways are organised through **training institutions, employers or support for individual self-learning**, with most countries pursuing **a multi-**

pronged approach that combines at least some of these. There is an increasing availability of individual pathways supported by vouchers, individual learning accounts and similar approaches.

- **The improvement of adult digital skills can be found in nearly all countries' Recovery and Resilience Plans**, but the extent of its importance differs. This applies not only to adult digital skills, but to digital skills more generally. Common measures prioritised in the plans include upgrading the policy framework, support for demand-based upskilling through individual empowerment, and the use of public employment services to fund investment in both the employed and the unemployed.

Key message 2. A wide range of initiatives are dedicated to improving adults' digital skills; however, these appear to vary greatly between countries and target groups. Consequently, access to digital skills programmes is not always universal and equal.

- Public support for the acquisition of digital skills tends to be provided by funding employer-based programmes, individual learning through vouchers or learning accounts, or by creating platforms that connect individuals and enterprises with specific providers.
- Many initiatives are bottom-up and demand-driven. However, even in countries in which a plethora of options are available, **accessibility is a challenge.**
- This challenge tends to be addressed by **aggregators and/or virtual providers**, generally created at national level and using public funding. These span from providers of information, through funders, all the way up to organisers of training activities. However, not only do such providers exist in a minority of Member States and regions, but they also have major weaknesses. In most cases, they are most likely to be successfully accessed by those who already possess some level of digital literacy, leading to the so-called 'Matthew effect', in which more is given to those who already possess some initial endowment. Investment in individual learning accounts and vouchers offers the potential to address the issue of accessibility.
- In addition to digital gateways, **there is a parallel track of place-based networks of providers** that focus on both basic and more advanced digital skills. Even though such networks provide a physical alternative to digital pathways, the effectiveness of their activities and programmes remains to be seen, as they are rarely evaluated.

Key message 3. Due to its evolving nature and the lack of rigorous research, **no exhaustive mapping yet exists with regard to what is currently offered in terms of digital skills provision**. There is also very limited evidence regarding the causal effects and relative cost-effectiveness of existing policies and interventions. This leads to difficulties in identifying best practices or exemplary models for the provision of digital skills to adults.

Given the significant resources invested in digitalisation strategies and digital skills acquisition, as well as the increasing importance of such skills both to social cohesion and to economic transformations, authorities at European and national levels should **invest more in gathering rigorous evidence on the topic, and should develop a set of good practices** that could, with adjustments to national circumstances, be rapidly spread across Europe. This is an important area for future research, and requires relevant infrastructure to foster data collection (such as the development of precise indicators and the application of innovative big data approaches), as well as a greater focus on impact evaluation to understand the effects in both the short and long terms.

1. Introduction

This report has been prepared in response to the request by DG EAC to provide "a focused literature review on the provision of digital skills to adults in Europe". The report was requested to "cover articles and grey literature (reports, white papers, position papers) that describe, discuss or inform about courses or programmes on digital skills for adults". While the provision of digital skills is at the centre of the report, national policies to support or promote such provision are also included.

DG EAC's request covers provision that goes beyond (or occurs after) higher education, and where courses or programmes are either work-based or provided in a non-formal or informal context and are targeted at adults of working age (between 25 and 65). In terms of skills, the report takes into consideration the average digital skills required by those adults who wish to re-skill and upskill. Finally, the report focuses mainly on articles and reports published during the last four years (from 2018 onwards).

The research questions on which this report is based primarily concern the current provision of digital skills to adults (as defined above) in Member States across the European Union (e.g. What aspects are addressed by policies relating to the development of the digital skills of adults, which thematic areas and target groups are covered by the existing provision of digital skills, and how current provision addresses the needs identified). The report does not take into consideration *why* adults might need digital skills.

In response to the request, the research team first analysed more traditional sources of academic and policy information, beginning with EPALE (the Electronic Platform for Adult Learning in Europe); thematic websites on skills, adult and/or digital skills maintained by OECD and the European Commission; as well as examining the web pages of prominent organisations in the field such as All Digital.[1] While these sources provided some relevant information, particularly with regard to national policies, they contained limited information on the actual provision of digital skills. A subsequent Google Scholar search using keywords such as 'digital skills', 'adult digital skills' and others (e.g. in combination with country names or in national languages) resulted in the identification of several hundred additional papers covering relevant themes. The results of this literature review are covered in Chapter 2.

Despite this multitude of sources, the utility of these papers for the purposes of the survey was limited, as an overwhelming majority of them could not be used due to one or more of the following factors: they were papers focusing on definitions and conceptualisations; papers dealing with the measurement of digital skills; works on pedagogical techniques; general policy analysis; non-EU experiences and/or papers that were more than five years old.

The research team therefore began to examine primary sources, using a variety of approaches to identify a sufficiently broad sample of courses or programmes being provided. These sources included the following:

- Unpublished source material used for the creation of the Index of Readiness for Digital Lifelong Learning created by Centre for European Policy Studies in 2019 (used with the permission of the CEPS);
- Reaching out to national correspondents/contacts, which proved successful in five countries (Portugal, Czechia, Spain, Belgium and Lithuania), where tips and suggestions were provided;

[1] For more information, see: https://all-digital.org.

Analysis of national Recovery and Resilience Plans (RRPs; defined as the coordinated investment at the European level, which aims to "mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions" (Recovery and Resilience Facility)[2], using the Annex to the Council Implementing Decision, with regard to adult digital skills;

The results of the analysis of these additional, primary documents is presented in Chapters 3 and 4.

The structure of the report is as follows:

- Chapter 1 – Introduction;
- Chapter 2 – Review of the literature on adult digital skills;
- Chapter 3 – National policies on adult digital skills;
- Chapter 4 – Provision of adult digital skills;
- Chapter 5 – Conclusions.

[2] For more information, see: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en#national-recovery-and-resilience-plans.

2. Review of the literature on adult digital skills

Digital skills is a prominent theme in policy discourse and research. This long-term trend has recently been strengthened due to the COVID-19 pandemic prompting policymakers and practitioners to set up and provide remote learning at all levels of education and training. Moreover, the pandemic and the connected need to work remotely have also incentivised many adults to reflect upon and act to improve their digital skills, as evidenced by a spike in enrolments into massive open online courses (MOOCs) in 2020 (Shah, 2020). Similarly, the broader issue of adult skills has received fairly extensive coverage, primarily in relation to upskilling and training to align labour markets with the rapid transformation of global economies. While adult digital skills, which lie at the core of this report, have been less frequently covered in the existing literature, the real challenge in researching the subject arises when looking for papers that analyse and evaluate particular national or international policies and initiatives relating to the provision of digital skills to adults.

Before moving on to specific papers, it must be mentioned that a major overlap exists between literature that focuses on digital skills, and literature which examines the digitalisation of education. This is understandable, given that digital skills are often transferred through digital means of instruction. The majority of scholarly work in the area of the digitalisation of education focuses on MOOCs, their methodologies and challenges. Sometimes, these can themselves be relevant to digital skills. This is true in the case of Edelsbrunner et al. (2022), who look at an Austrian MOOC platform and, taking an approach oriented towards action research and design-based research activities, examine to what extent the MOOC fostered digital skills among its participants. For a more holistic review, Zhu et al. (2020) examine the broader trends in empirical research on MOOCs, review 441 empirical studies published between 2009 and 2019. However, their findings and the results of other studies on MOOCs are rarely relevant to the objectives of this report. We do not therefore present them in greater detail.

2.1. Adult digital skills in the literature

Academic and 'grey' literature that focuses on actual adult digital skills is dominated by studies which look at the conceptualisation of digital skills and their quantification in the population. In terms of conceptualisation, the most influential and widely cited literature was published prior to 2018, e.g. a review by Ferrari (2012) review of 15 different frameworks, a conceptual paper by Freiman et al. (2016), and a comprehensive disaggregation of digital skills by Van Deursen and Van Dijk (2014).

More recently, some authors have stressed that digital skills can be conceptualised in terms of the technology and environment in which they are used – for example, Bode and Gold (2018) define them as cognitive skills that are specific to using digital technologies and working in digitised environments. A similar, though broader definition is the point of view taken by the OECD in context of the Programme for the International Assessment of Adult Competencies (PIAAC), which measures the ability to solve problems in technology-rich environments.

Digital literacy has generally been understood as a subset of digital skills. As Harris et al. (2019) note, while the definition of 'literacy' changes with the emergence of new technologies, literacy always involves decoding and comprehending words as well as understanding and interpreting the world. Thus, being 'literate' requires individuals to be able to make sense of texts across a variety of media and to apply that knowledge to their daily lives (ibid.).

Certain academic contributions have not aimed to provide a coherent framework to define digital skills as such, but examined how digital skills should be studied and measured

methodologically to begin with. Allmann and Blank (2021) have thus framed their argument by proposing participant-observation of new users "in the process of learning new skills along with interviews with the people who help them". They propose that new theories of skills and ways of measuring them will follow from such observation. Such an ethnographic approach has led Ticona et al. (2018), for instance, to conclude – in relation to their fieldwork with workers in domestic service industries working on digital platforms – that these workers needed to acquire "digital fluency", not merely "digital literacy", to succeed in platform labour. This is because a large part of the experience of such workers when using digital platforms has been defined by "individual invisibility"; namely, the need to publish a lot of information about themselves in order to appear legitimate to their customers and present themselves favourably.

In addition – and equally importantly –a similarly extensive amount of statistical analyses have been made of the digital skills gap across the Member States. For instance, using Eurostat data, Bejaković and Mrnjavac (2020) show that a statistically significant relationship exists between digital skills and employment rates in the European Union. Zooming in on country-specific analyses, Zilian and Zilian (2020) show a negative relationship between female gender and individuals' "problem solving in technologically rich environments" (PSTRE) score, as well as a positive relationship between PSTRE score and higher socio-economic background in Austria. While their analysis of aggregated Eurostat data demonstrates that certain differences in ICT use had declined in importance by 2019 compared with 2011/2012 (particularly gender and age-related inequalities in the use of Internet), other digital inequalities, such as those within the group of people with the most advanced digital skills, have remained relatively pronounced.

Likewise, Ābele et al. (2021) utilises Latvian data from the Digital Economy and Society Index (DESI), a composite index created annually by the European Commission to track the digital competitiveness of EU Member States, which includes a pillar (Human Capital) on the digital skills of adults. The authors conclude that while in some areas such as 'Connectivity', Latvia ranks very highly (4th place), the country's main issue is a poorly developed 'Human capital' area (24th place), which consists of two equally weighted dimensions ('Internet User Skills' and 'Advanced Skills and Development').

Some scholars have also analysed the topic by focusing on particular sub-groups. This approach is exemplified by a paper by Potocky (2022) in "digital migration studies", which looks at issues relating to the role of digital skills in refugee education. After conducting a literature review into the state of the art among recent papers in this sub-field, she concludes that digital skills affect all aspects of integration, and confirms that many refugees in resettlement programmes lacked the digital skills required for "integration tasks" such as browsing websites and critically evaluating the credibility of information found online.

2.2. Literature on adult digital skills policies

While the body of literature focuses on policies relating to adult digital skills is small, it is fairly broad and addresses policies at a high level. For instance, Bode and Gold (2018) recommend that the G20 countries create national adult training programmes, which would focus on theoretical, non-cognitive and digital skills and target those workers most susceptible to losing their jobs due to automation. Moreover, they make suggestions on how to justify the funding of such programmes, and propose that governments create a single national agency that would deal with the administration and control of such schemes. A policy brief by Lyons et al. (2019) also focuses on "vulnerable populations" (i.e. people with "low-skilled jobs in such industries as agriculture, textiles, and manufacturing"). The report's recommendations broadly relate to four topics, namely:

(i) creating a multi-level educational approach to preparing vulnerable populations (ranging from reforming existing formal education systems to promoting internships and apprenticeships);
(ii) publishing instructional resources with digital content for underrepresented populations;
(iii) delivering digital content to vulnerable populations; and
(iv) harnessing the power of public-private collaborations.

Fau and Moreau (2018) also show that adults' skills are determined by socio-economic factors, which in particular – and quite intuitively –relate to the level of training. Analysing what circumstances are most important to the development of digital skills through a comparative analysis of a number of countries, the authors establish the main criteria as being the quality of infrastructure, the level of digitisation of businesses, and the wealth of digital content available. The good practices they outline include "monitoring the level of digital skills, integration of digital technology in the global education ecosystem (beyond ICT lessons), supporting educational reforms with proper teacher training and fighting against digital exclusion which often leads to social exclusion".

The Rand Europe Report (Feijao et al., 2021) examines how businesses specifically can fight the digital skills gap. The report recommends, for example, that employers should adopt skills-based hiring practices or offer opportunities to gain industry experience as alternatives for building skills.

While the report by Emsi (2020) on the adult education budget expresses equal concern over the necessity for digital skills development, its recommendations remain somewhat vague. Namely, it suggests funding pre-employment programmes by "(a) reviewing and reforming adult education funding, re-prioritising existing funding to support people back into work, and (b) pushing digital transformation further by encouraging employers and education providers to work together to maintain the widespread adoption of online learning and enhance digital funding".

For a perspective that focuses on the policy frameworks within which individual initiatives are embedded, we can turn to multiple papers. One of these is that of Perifanou and Economides (2021), who write about the long-term policies aiming to improve the digital skills of teachers in Greece. Here, the authors comment on the decentralised ways in which such programmes are administered by a number of agencies in the country.

Another insightful source is a paper published by Pelse and Lescevica (2020), which seeks to analyse the importance of digitalisation in a number of strategic policy documents relevant to lifelong education: Specifically, they examine the National Development Plan of Latvia 2021-2027 (final version), the Digital Agenda 2020 for Estonia and the Progress Strategy 'Lithuania 2030'.

Whereas most of the papers above provide an analysis at national level, the contribution of Morandini et al. (2020)– written on behalf of the European Commission's Directorate-General for Economic and Financial Affairs – considers the role of the European Union. The authors subsequently argue that "while education and training policies fall mostly under the responsibility of Member States, the EU can support human capital development by promoting cooperation and the exchange of best practices among Member States, and through targeted financial support".

Other papers have been written with a particular, more niche target group in mind. Ramos Garcia et al. (2021) investigate how the older adult population has been affected by the shift towards digital devices during the pandemic, and address possible ways of improving

their digital skills moving forward. Moreover, they encourage researchers and policymakers to "utilize the comprehensive and reliable knowledge, background, and consciousness from gerontological fields". This call is taken up by Gates and Wilson-Menzfeld (2022), who interrogate the implementation and delivery of programmes for (middle-aged and older) adults, and analyse the respective adult learning theories underlying them – an approach they term (critical) geragogy. On the basis of literature published between 2010 and 2020, the authors identify the following themes as central: "negative perceptions of aging; the learning environment; and value of technology".

2.3. Provision of digital skills for adults

A fair amount of literature exists regarding target groups too niche or skills too advanced to be of relevance to this report. An example of both of these limitations would be the paper published by Lee (2021), which focuses on mobile journalists and skills such as "writing better headlines and stories for mobile audiences, shooting and editing 360° videos, and programming skills such as HTML". Here, despite its lack of directly applicable insights, the paper points to the usefulness of micro learning as a pedagogical method (i.e. learning in small chunks, at the learner's own pace). Nevertheless, such types of paper are not analysed at length in this report.

However, another example that speaks to the merits of flexible learning comes from Muñoz-Hernández et al. (2021). In it, the authors explain the methodology created by the Universidad Politécnica of Madrid (UPM) group TechPeopleCare, as applied to the 'e-Health Inclusion through ICT Training' project in 2019. This project recruited participants "with different lifestyles and migrant backgrounds, with high female participation". Focusing on those skills most necessary to the success of e-Health interventions, the authors found that the motivation to learn remained high, and the option to review content at the individual's preferred pace and without an instructor was valued – especially by younger cohorts with migrant backgrounds. While the majority of participants reported that they were keen to continue learning regardless of the training methods, the authors conclude that "allowing for individual and independent learning 'by doing' appears more accessible to suit different lifestyles and more sustainable than traditional computer classes".

Similar conclusions are reached by White et al. (2018), who examine the 'IM HAPPY' project from Coleraine, Northern Ireland. The project offers short IT courses to learners across different age groups and, based on feedback from learners, also began to provide modules in beginner adult digital skills. In their paper, the authors thus analyse feedback from adult learners on the 12-week 'Introduction to Computers' course, the student profile, as well as the broader success of the course as measured through metrics such as confidence levels, pass rates and retention. As in the previous example, material was introduced at a reasonable pace, and prioritised making the students comfortable with technology in their own individualised ways and at their own pace.

Meylemans et al. (2021) choose a different angle: studying what motivates participants to join digital adult skills courses to begin with, by asking 'how to motivate workers whose roles are at risk of automation to engage in adult learning?'. Looking at a project from Belgium and identifying 'autonomous motivation' and the intent to continue learning as manifestations of feeling incentivised, they claim that the most common factors included "an autonomy-supporting work climate in which the learning activity is promoted, (previous) positive learning experiences, affinity with the topic, and intrinsic outcome expectation".

Another example that offers a very comprehensive, broad set of recommendations comes from Anthony et al. (2020), and focuses on the Nordic countries. While the report produces

a more general SWOT analysis of digital transformation, it goes on to provide a detailed and well-structured list of case studies on the following topics:

(i) national programmes and courses;
(ii) everyday digital skills;
(iii) security and democracy;
(iv) guidance;
(v) specific target groups; and
(vi) digital competence for teachers.

Although the report focuses on basic digital skills, it also contains some information about the provision of more advanced skills – for instance, by addressing the difficulty of getting citizens to understand the complexities of the Internet of Things (IoT).

Proceeding to European projects, Andone et al. (2020) take a look at UniCampus, an online learning environment from Romania. This is part of the DigiCulture project, which creates free, online courses for adults with poor digital skills – yet, as the authors argue, significant variation exists between the various European partners in DigiCulture. To address this, Andone et al. advocate for "an integrated approach for course development, but with national personalization as language, study cases".

Similarly, Clancy et al. (2020) interrogate Upskilling Pathways (UP), a European Council recommendation, the objective of which is to target people over 25 years old who wish to improve their digital skills, as well as literacy or numeracy, regardless of whether or not they are in employment. As the authors note, "individual countries may define priority target groups for UP depending on national circumstances and must identify sources of match funding". Clancy et al. analyse how the scheme has been implemented in the United Kingdom, Italy and Slovakia. They argue that this type of EU initiative is more than the mere borrowing of supranational schemes, and can be better understood as the adaptation of such schemes to domestic political, social and economic circumstances. As the authors note, "often the people in predominantly low-skilled, disadvantaged regions are the least able to take advantage of skills development opportunities unless such programmes are targeted at their particular needs in terms of access, support and outreach and understand their local context" (p. 159).

The Erasmus+ funding programme has been also used as a means to develop various training materials and programmes in the area of digital literacy. One example, described by Kenny and Hyland (2019), is the DELSA Project, a two-year Erasmus+ project involving five country partners and one pan-European partner. These stakeholders collaborate to develop free open-source training materials to improve adults' digital skills. Hence, they not only map out the existing modules in the participating countries, but also investigate how and which new modules should support such education.

Another paper, by Soeiro et al. (2018), is useful as it offers a fairly holistic perspective on the process of designing digital skills courses for adults. More specifically, the authors describe the objective of the programme they designed – 'Digital Skills Accelerator' – as being to define the goals and skills to be prioritised by participants, and to create a self-directed system via which such skills can be acquired. The paper is fairly broad in scope, in that it covers how the project gets from framing and defining the problem, through recruitment and marketing, to optimising and testing.

2.4. Conclusion

While the number of papers and 'grey' literature published on adult digital skills is substantial and growing, their utility for policy-relevant analysis of the related provision is limited. This is because such literature is predominantly concerned with the digitalisation of learning as well as the conceptualisation and measurement of digital skills, rather than assessment of specific programmes. Conversely, those papers that actually look at individual policies, programmes and projects are too few in number to provide an overview of the variety of real-world approaches that is broad enough for this review to be a sufficient analytical backstop to policy development.

3. National policies on adult digital skills

This chapter progresses beyond the review of academic and grey literature to present an overview and classification of additional data collected for this report concerning policies relating to the provision of adult digital skills.

The first part of the chapter presents information about relevant current national policies, while the second part deals with forward-looking changes contained in countries' RRPs. Given the paucity of existing literature, the text is based predominantly on primary documents – national strategies and RRPs. For the same reason, the chapter offers an overview rather than an analysis. It should also be mentioned that the capacity allocated to this report does not allow a detailed analysis of all aspects of the situations in all Member States. Nonetheless, this chapter not only presents factual information, but places it into context, particularly with regard to policy objectives, institutional responsibility and the means via which these goals are pursued.

3.1. Adult digital skills in national policies

Looking at policymaking in the area of adult digital skills on a strategic level, the most frequent approach among the Member States is to subsume this area and integrate into broader institutional responsibilities for education, and to deal with substantive policy aspects in the context of overall strategic documents on digitalisation.

Adult skills in general are often integrated into overall education policy, and adult digital skills tend to be included within the same group. This is the most common option adopted by EU Member States, for example in Bulgaria, Czechia, Estonia, Greece, Latvia, Lithuania, the Netherlands, Romania and Slovakia. In practical terms, it means that ministries of education are responsible for policies in this area. The advantage of this is that the digital skills and competences of adults are integrated into overall policymaking for education. However, challenges also exist in relation to lifelong learning (LLL) policies more generally – chiefly, that they generally tend to receive less attention from education ministries compared with primary, secondary and higher education, despite lifelong learning now being explicitly recognised in the Sustainable Development Goals (English and Carlsen, 2019).

Integration into education more generally can also mean the option of not having anyone explicitly in charge of adult digital skills, particularly in highly decentralised systems. For example, in Sweden, there appears to be no ministry officially responsible for driving formal digital learning in higher education or lifelong learning. In Germany, responsibilities are highly distributed – no single institution is responsible at federal level. Given the very different outcomes (for example, as manifested in the countries' rankings in the 2019 Index of Readiness for Digital Lifelong Learning), it appears that the impact of such a mode of institutionalisation (or lack thereof) is mediated by other factors in the overall environment.

Moving on from institutions to policy documents, most Member States have an identifiable policy document that devotes attention to the digital skills of adults. However, the scope of these documents, as well as the nature of their focus on adult digital skills, differ tremendously. The most common approach is to include adult digital skills (and digital skills in general) into an overall digitalisation strategy. This approach is taken, for example, in Digital Austria in 2050, Digital Bulgaria 2025, Germany's Digital Strategy 2025, the Dutch Digitisation Strategy 2.0, Denmark's Digital Growth Strategy and the Strategy of the Digital Transformation of Slovakia 2030. This report provides an overview of a number of such strategies and how they approach adult digital skills, particularly in terms of objectives and the means of achieving them.

Digital Austria in 2050 (Digital Austria website)**,** adopted in 2019, includes a focus on adult digital skills. Among the overall goals of the strategy, two are of relevance: digital the transformation of Austria's educational system, which includes the "certification of digital skills development programmes," with the additional aim of strengthening of digital basic training in further education (Digital Skills & Jobs Platform, 2021). Furthermore, the strategy also has the objective of ensuring that all citizens possess basic digital skills (ibid.). The overall digital strategy is complemented, in terms of adult skills, with a specific, targeted initiative – a **Digital Skills Check**.[3] This system, introduced in 2021 specifically for digital skills, is available to cover the costs of professional training in digital skills (IT management, cyber security, e-commerce), but only for SMEs (including the self-employed). It can fund 80% of costs, up to EUR 1,000 per employee, with up to 10 checks per company.

Also in 2019, Bulgaria adopted **Digital Bulgaria 2025** (Ministry of Transport and Communications, 2019) Two of its areas of focus relate to adult digital skills: 'Improving the digital and ICT skills of the workforce' and 'Increasing the number of highly qualified specialists in the field of ICT' (Digital Skills & Jobs Platform, 2021). In both cases, lifelong learning and upskilling approaches are the main instruments mentioned as a way to achieve these goals. The programme is accompanied by a roadmap, which sets out specific objectives and instruments to achieve the goals, and includes provision.

Denmark's **Digital Growth Strategy 2025** (Ministry of Industry, Business and Financial Affairs, 2018) was approved by the Danish government in 2018. Although it contains a separate chapter called 'Digital Skills for All', which provides far-reaching and specific measures, these generally concern other aspects of skills development. Commitments relating to adult digital skills, meanwhile, resemble a short summary of pre-existing initiatives, specifically mentioning: "agreement on an adult and continuing education initiative from October 2017, through which a transformation fund was set up, along with a more targeted, flexible course portfolio and a new subject, 'Digital FVU'" (FVU stands for 'Forberedende voksenuddannelse', which translates as 'Preparatory Adult Education') (2018, p. 37).

Germany adopted its current **Digital Strategy 2025** in 2016 (Federal Ministry for Economic Affairs and Energy, 2016). This document refers mainly to initial education, but also recognises that "because of the rapid pace of technical progress, continuing education is the key to lifelong learning and Work 4.0" (2016, p. 53). The strategy contains several specific initiatives to implement this declaration, which are targeted either at employer-based provision, or towards individuals. They include establishing industry-wide continuing education centres to offer further training in digitalisation; working with trade unions and employers to create the means for more flexible and individualised digital continuing education; developing evaluation and certification systems for the continuing education of employees without access to a company continuing education programme, in order to increase the attractiveness and transparency of such offers; and contributing to an effort to make continuing education generally more flexible.

The Dutch **Digitisation Strategy 2.0** (Nederland Digitaal, 2019) approved in 2019 contains objectives and measures relating to adult digital skills, under which individuals are targeted both as citizens and as workers. It envisions a multi-year lifelong learning action agenda to include "pilot projects with training and employment helpdesks, efforts to encourage a culture of learning in the SME sector, exploration of a personalised digital portal offering training opportunities, and the facilitation of a more flexible range of adult education programmes and individual learning and development budgets" (2018, p. 21). While the strategy contains a number of specific initiatives, it also notes that: "The

[3] For more information, see: https://www.ffg.at/ausschreibungen/DigitalSkillsSchecks-2-Ausschreibung.

government, business sector, public organisations and knowledge institutions have already initiated numerous initiatives towards the development of digital skills and lifelong learning. The main challenge thus lies in accelerating, strengthening and connecting existing activities rather than developing or introducing new ones" (2019, p. 19).

Strategy of the Digital Transformation of Slovakia 2030 (Ministry of Investments, Regional Development and Informatization of the Slovak Republic, 2019), adopted in 2019, conceptualises adults in terms of different dimensions – as consumers, citizens, patients and workers. In nearly all of these dimensions, it acknowledges the importance of digital skills, but specific action items overwhelmingly focus either on interventions outside the area of skills, or at digital skills development during initial education and with regard to teachers.

A second approach to policymaking in the area of adult digital skills is to embed adult digital skills policy into a narrower document, such as the **Lithuanian Industry Digitisation Roadmap 2019-2030** (Ministry of the Economy and Innovation, 2019), which contains actions specifically relating to digital skills as a part of an Industry 4.0 initiative. However, this is no guarantee of specific measures. The Roadmap, adopted in 2019, only states that there is a skills gap and that adult digital skills need to be developed, identifying 'people' as one of the four pillars of the plan ("refers to policy-makers, researchers and creators, enablers, and intermediaries that will play a critical role in the digitisation of industry along the private sector and investors" (2019, p. 15)).

For the purposes of this report, a more interesting approach has been taken by Ireland when it formulated its **10 Year Adult Literacy, Numeracy and Digital Literacy Strategy** (SOLAS learning works, 2021), which has as one of its key objectives the aim of helping individuals to build their digital literacy. The strategy, adopted in 2021, has a clear objective of reducing the share of adults in Ireland without basic digital skills from 47% to 20% (as measured by DESI). It comprises four pillars focusing on overall literacy, but with two specific digital literacy actions. The first is gathering together all informal and accredited, private and public, onsite and online digital skills opportunities in one place in the form of a 'one-stop shop'. The second is to expand investment in digital skills provision across formal and non-formal routes.

Alternatively, a digital strategy can focus more closely on the topic of digital adult skills. An example of this is 'E-inclusion for Belgium' (POD Maatschappelijke Integratie, 2021). The implementation of this strategy is also indirectly supported by a targeted **Digital Belgium Skills Fund**, which provides financial support to projects that teach socially vulnerable young people and (young) adults digital skills through short or medium-term training initiatives. This is publicly funded, but run by the King Baudouin Foundation, and has an independent jury selecting which projects to support. Between 2016 and 2021, it funded 27 projects worth EUR 5.9 million. The situation in Belgium is complex due to the country's federalisation structures. The federal Minister of Digital Agenda oversees the long-term strategy of digitalisation in Belgium, with the Ministers of Education of the three regions in charge of actual implementation of policymaking.

Lastly, due to the increasing prominence of the issue, several Member States have formulated a specific policy or strategy for digital skills, frequently linked to the increasing prominence of digital transformation in policymaking.

In April 2017, the Portuguese government established the National Digital Competences Initiative e.2030 (**Portugal INCoDe.2030**) (FCT, 2017) as an integrated public policy to enhance and foster the digital competencies of citizens over the next 13 years. This is an inter-ministerial activity, as it requires the mobilisation of efforts from different areas of governance and civil society. It involves the Portuguese Deputy Secretary of State for

Administrative Modernisation; the Ministry of Science, Technology and Higher Education; the Ministry of Education; and the Secretariat of State for Employment.

Among the key objectives of the initiative is to "promote digital literacy and basic digital skills amongst the general population to increase the number of Europeans with at least basic digital competences to 80% by 2030 (and reduce the % of citizens who do not access the internet to 5%)" (Digital Skills & Jobs Platform, 2021). It contains a number of activities in this area, such as various IT retraining programmes aimed at different groups (Qualifica IT, Acertar o Rumo, Apostar em TI, IT training programme for graduates in insecure work conditions), but also citizenship training in digital skills and actions aimed at digital inclusion through the provision of basic skills.

A similar long-term approach was taken in 2020 by Italy in its **National Strategy for Digital Skills** (Ministero dell'Istruzione, 2020), led by the Department for Digital Transformation with its own minister, under the Prime Minister. This department has been working with line ministries, in particular the Ministry of Education but also the Ministry of Economic Development, on the digitalisation of learning for continuous training.

Among other objectives, the strategy aims to "equip 70% of the population with at least basic digital skills and bridge the gender skills gap in the ICT sector", as well as to "double the rate of Italian citizens with advanced digital skills (78% of young people with higher education, 40% of workers in the private sector and 50% of civil servants)" (Digital Skills & Jobs Platform, 2021). To achieve these objectives, the strategy proposes to create education paths for adults within schools, as well as training paths within the non-formal educational circuit. Outside the education system, it also proposes training in digital skills and awareness campaign, carried out with the help of neighbourhoods, local communities and public spaces such as libraries, to create networks of assisted access points and digital facilitation stations.

Italy also uses fiscal instruments to stimulate digital skills, in the context of the Industry 4.0 training tax credit. This applies to 30-60% of eligible expenditure in categories related to Industry 4.0, in which there is a large overlap with digital skills. Each of the eligible areas involves digital skills: big data and data analysis; cloud and fog computing; cyber security; simulation and cyber-physical systems; visualisation systems, virtual reality (VR) and augmented reality (AR); advanced and collaborative robotics; human-machine interfaces; additive manufacturing (or 3D printing); IoT and machines; the digital integration of business processes.

Several Member States now have a dedicated 'digital' ministry. In **Hungary**, for example, this is the **Ministry of Innovation and Technology**, which is responsible for the field of digital transformation, ICT and informatics, including digital skills. This ministry has produced a unique strategy focusing specifically on adults – the **Hungarian Digital Workforce Programme** (A Digitális Pedagógiai Módszertani Központ Magyarország, 2018), which is a twin of the Digital Education Strategy aimed at the initial education system. Adopted in 2018, its goal is to provide digital skills for all citizens, for workers and specifically for ICT professionals, using several instruments including the Digital Success Programme Network – a web of centres, contact points and mentors.

However, having a specific digital skills strategy is not reliant on the existence of a special ministry. In Spain, the **National Strategy for Digital Skills** (Ministerio de Asuntos Económicos y Transformación Digital, 2021), created in 2021, focuses heavily on improving the public's basic digital skills and closing divides between groups, but also equipping workers with the digital skills required in the workplace and meeting the demand for specialists in digital technologies. Its implementation is driven by National Digital Skills Plan, which has four programmes – three of which three are relevant here: the digital

training programme for the general public; the digital skills programme for those in work and the unemployed; and the programme for specialists in basic and advanced digital technologies.

3.2. Adult digital skills in national Recovery and Resilience Plans

With their focus on digitalisation, RRPs offer a major opportunity for updating, upgrading and scaling up national policies on adult digital skills. They also provide a forward-looking view on the directions in which different governments are heading. Therefore, this report includes an overview of both reforms and investments that relate specifically to adult digital skills.

This section is based primarily on an analysis of all the Council Implementing Decision Annexes that are in the References. To improve the reading experience, individual plans are not referred to in the text itself. This overview is also informed by a recent thematic analysis of the coverage of digital skills in the RRPs, published in April 2022 by the European Commission (2022).

Table 1: RRPs and adult digital skills

Category	Member States
Member States whose RRP could not be analysed	Netherlands Hungary Poland
Member States whose RRP does not feature adult digital skills	Bulgaria Sweden
Member States whose RRP contains no or very limited investment in adult digital skills, but some reforms	Austria Czechia Denmark Estonia France Germany Ireland Lithuania Malta
Member States whose RRP contains both reform and investment in adult digital skills	Belgium Croatia Cyprus Finland Greece Italy Latvia Luxembourg Portugal Romania Slovakia Slovenia Spain

Source: the authors, based on annex to each Member State's CID.

As we can see, of those Member States whose RRPs could be analysed, only two do not appear to have any actions in their RRPs relating to adult digital skills – Bulgaria and Sweden.

3.2.1. Reforms

Reforms relevant to adult digital skills largely focus on the development or upgrading of relevant strategies. The new policies are targeted at various levels.

In Denmark and Croatia, national RRPs plan to develop the respective countries' overall digitalisation strategies. While these specifically mention digital skills as one of their elements, they do not tackle adults or lifelong learning in this regard.

Alternatively, the strategy may be skills-oriented rather than digitally oriented. Greece and Lithuania commit to the development of comprehensive lifelong learning strategies, while Finland focuses specifically on strategies to reform continuous learning. Ireland goes even further, with a 10-year plan concentrating solely on adult literacy, numeracy and digital literacy.

A third group of countries – Slovakia, Spain and Cyprus – pledged to approve specific digital skills strategies. In the case of Spain, this is called the National Digital Competences Plan; in Cyprus, it is the E-skills Action Plan. While it may be expected that such strategies will include an element focusing on adults, this is not specifically mentioned.

Beyond the realm of strategic documents, specific reforms relating directly to digital skills are usually linked to investments that flow from them – a common framework for the assessment of basic digital skills in the case of Latvia; setting up a voucher system for adult education, training and upskilling in Croatia; integrating digital skills into active labour market policies in Italy; or expanding opportunities for upskilling and reskilling for all adults in Malta, regardless of their employment status, through the creation of an e-college.

3.2.2. Investments

The most frequent approach towards investments in adult digital skills is through various types of broad-based measures. Such approaches include demand-based schemes such as individual learning accounts and learning vouchers, but also involve training organised by public organisations that focus on the whole population.

Starting with the former, France and Latvia plan to support individual learning accounts from their RRPs – in both cases, with an explicit emphasis on digital skills. For Latvia, there is even a specific objective to support "3,500 adults to acquire digital skills through individual learning accounts" (European Commission, 2021, p. 23).

Croatia and Luxembourg intend to use individual vouchers in relation to digital skills, though in both cases this is within a broader framework of support for lifelong learning. In Croatia, the RRP funds the implementation of an overall voucher system for adult education, training and upskilling, which is complemented by another investment – digitalisation vouchers and digitalisation grants for companies, again explicitly containing support for digital skills.

A third type of broad-based investment, present in France, Finland and Portugal, concerns continuous learning through the inclusion of and emphasis on digital skills, In France, the

objective is to expand distance learning overall, while in Portugal it is to "promote adult learning through an upscaling of the National Plan for Adult Literacy to improve basic literacy, numeracy and digital skills" (European Commission, 2021, p. 73).

Countries such as Spain and Belgium (Flemish Region) also prefer to route investments in adult digital skills through broad-based plans in which, for example, the RRP funds the implementation of an agreement concluded between the Flemish government and social partners, which includes the objective of the "digital transformation of Flanders".

The second most frequent group of investments in digital skills is investments in employed persons through employers and the Public Employment Services (PES). Such provisions are present in the RRPs of Czechia, Romania, Italy, Portugal, Spain, Latvia, Lithuania, Romania, Greece, Cyprus and Malta. For example, in Czechia, this includes upskilling or reskilling for 130,000 people in digital skills or similar, half of which should be undertaken by employers. The remaining half should be undertaken by labour offices, where 14 training centres are being established for this purpose through RRP funding.

In Portugal, a programme called the Digital Empowerment of Enterprises aims to target employees via two initiatives – Academy Portugal Digital, which has the target "to reach 800,000 participants in online, blended, and face to face digital skills training" (European Commission, 2021, p. 145), and Employment + Digital 2025, which aims to go further by offering deeper digital skills training to 200,000 participants.

The third most frequent type of intervention is active labour market measures aimed at the unemployed, which are present in the RRPs of Austria, Latvia, Spain, Luxembourg, Belgium (federal, as well as capital), Italy, France, Cyprus and Greece. In many countries, these plans are fairly generic, but some very specific measures are described, such as FutureSkills in Luxembourg, which funds soft, digital and managerial skills provision for selected and motivated job seekers over 45 years of age.

In addition to these target groups, two other types of adult digital skills training come up several times in the RRPs. Of these, the much more frequently occurring one is in basic (digital) skills, which is mentioned as a specific type of investment by France, Portugal, Spain, Italy, Latvia, Romania and Malta. The second is youth as a target group, with Latvia, Greece and Spain aiming to improved the skills of this group. In Latvia, the two groups are included in a single investment with specific targets such as "basic digital skills for at least 50,000 people, and complete digital skills programmes for youth in all 42 municipalities" (European Commission, 2021, p. 24).

In addition, there are individual schemes that reflect the priorities of individual Member States. In Italy, health workers and the disabled will receive specific investments in their digital skills, while Greece and Slovenia select public sector workers as a whole, with particular attention being paid to teachers. At the federal level in Belgium, 'E-inclusion for Belgium' focuses on the digital skills of vulnerable target groups as well as those of their caregivers. In Finland and Spain, RRPs focus on the cybersecurity skills of the population as a whole, not just of experts.

In Latvia and the Flemish region of Belgium, action is planned at municipal level. In the Flemish case, this involves the "social and economic integration of vulnerable groups by fostering their digital inclusion at municipal level, comprehensive action including skills training" (European Commission, 2021, p. 89). In Romania, the RRP foresees funding schemes for libraries to become digital skills hubs, with other countries such as Italy also adopting place-based schemes, though these are not limited to one type of facility.

3.3. Conclusions

This chapter has presented an overview and classification of additional data collected for this report concerning the policies of EU Member States with regard to adult digital skills. Looking at policymaking in the area of adult digital skills at a strategic level, the most frequent approach among Member States is to subsume it, integrating instead into broader institutional responsibilities for education policy and strategic documents on digitalisation.

Regardless of whether policy on adult digital skills is incorporated into a digitalisation strategy or a specific digital skills policy document, some common strands emerge. Individuals are most often targeted as citizens or as workers, with particular attention being paid to the inclusion of those lacking digital skills and to addressing the gender divide. Education pathways can be achieved through training institutions, employers or via support for individuals, with most countries pursuing a multi-pronged approach that combines at least some of these.

The second part of the report deals with forward-looking changes contained in countries' Recovery and Resilience Plans. Although the improvement of adult digital skills is present in nearly all of these national plans, the extent of its importance differs. This applies not only to adult digital skills, but to digital skills more generally.

Common themes include the upgrading of the policy framework, support for demand-based upskilling through individual empowerment, and the use of public employment services to fund investments in both the employed and the unemployed.

4. Provision of adult digital skills

This chapter of the report surveys programmes and projects that provide digital skills to adults in the EU. These range from national systems to individual, bottom-up initiatives. Given the varied and potentially infinite list of such initiatives, the survey here cannot be deemed comprehensive or even fully representative. Its point is to supplement the literature survey presented in Chapter 2. The focus of data collection has been on programmes that are comprehensive and system-wide in the sense that they cover a whole country or region and provide access to a broader ecosystem of specific courses. However, to illustrate the wide range of initiatives available, it also contains a number of examples of different types of individual, bottom-up initiatives.

The provision of digital skills is frequently part of a broader set of lifelong learning activities and services. This greater scope can be either integrated horizontally (with similar digital and non-digital training being offered side by side), or vertically (where digital skills acquisition is a part of a chain of activities that also includes internship, mentoring, job matching, subsidised job placement and many others). Obviously, this review focuses on those programmes and projects which consist exclusively of digital skills, or in which such elements are prominent.

In all cases, this chapter focuses on the supply side – it is concerned with provision and its facilitation, not with policies or funding mechanisms. It has been researched and written due to the paucity of similar information in the existing literature. However, its scope and depth are limited by the capacity constraints of the report.

The chapter begin with several types of programmes that may be termed 'gateways' – initiatives that focus on providing broad access to the provision of digital skills. These include:

- Aggregator services that bring together training provision organised by others, and provide information and access to such provision;
- Virtual providers, which are a more sophisticated version of the same approach, in which the platform also provides access by pre-selecting participants and/or funding their training;
- Organised, place-based networks of providers focusing specifically on digital skills;
- Repurposing networks of existing training institutions for the provision of digital skills.

The survey then goes on to look specifically at other large-scale national or regional programmes which focus specifically on the employed and/or unemployed as a group. These can be mediated via employers or public employment services, or offered to the target group directly and on an individual basis.

The last type of programme examined in this chapter comprises demand-led initiatives, which can range from the offerings of a single provider to programmes that focus on a specific target group. Target groups can be based on perceptions of vulnerability (youth, older, women, refugees); professions (ICT, health, teachers and public administration); or such initiatives can be private sector portals, essentially open to anyone willing to pay.

4.1. Aggregators

This category includes those programmes and projects that do not provide their own training services, but serve as aggregators of content by others. This does not mean that

they have to consist of simple lists. In Austria, **Fit4internet**[4] offers a course list (a 'f4i-catalogue') of more than 140 courses from different providers for the general Austrian population, which are organised by competence level and competence areas and contains detailed information on cost and content. In addition, the user can go through an assessment quiz to determine their level of competence. The aggregator also provides a link to the website for the Austrian Digital Check, a programme mentioned in Chapter 2, which is aimed at funding digital skills training for SMEs. However, the two are otherwise separate initiatives.

Another example of an aggregator is **Portugal Digital Academy**[5], which began in March 2022. It is a free course aggregator platform where individuals can assess their digital skills, receive training and explore career opportunities. It is aimed at "anyone looking to improve their digital skills" or "anyone looking to specialise in a digital field", as well as "any business looking to train its staff in digital fields". The range of training offered ranges from specific skills for working in the ICT industry to broader digital skills for workers in any sector. It is provided by the National Agency for Qualification and Vocational Education.

One innovative approach is the Dutch government website **Informatie Punt**[6] ('Information Point'), which simultaneously provides advice, but also directs users to information and opportunities for digital skills learning including physical locations close to one's own home. The target group addressed depends on the level of the skill concerned, and may occasionally involve users being required to have certain language skills.

Such platforms are often an offshoot of a broader organisation or project aimed at digital skills. For example, **DigiSkills Belgium**[7] is a platform of the Belgian National Coalition for Digital Skills & Jobs, which aims to "inform Belgians about what is available in terms of training initiatives… [and] activate anyone who wants to train, retrain and adapt their skills and work experience to new digital requirements, promote lifelong learning and better employability prospects." In a similar way to Austria's Fit4internet, it allows content to be filtered by types of activity, target groups, topics and level of knowledge (Beginner/Advanced/Expert).

Such programmes do not necessarily focus solely on digital skills, but digital skills can form a part of a broader offering of lifelong learning. For example**,** the **Digitalizate+**[8] platform run by the Spanish State Foundation for Employment Training and aimed at the general public (while being divided on the basis of levels of advancement) links to various courses provided by 47 companies, which include both shorter and longer online courses focusing on various skills, but with the heavy presence of digital skills.

Aggregators are generally provided in the local language, thus making them by default limited to courses provided regionally or nationally. One interesting exception is **eSkills**[9], which makes use of the fact that English is one of the official languages of Malta. It is an aggregator of free ICT courses available globally in English. A rare example of an international aggregator is Digital Skills & Jobs Platform**[10]**, a multi-purpose website run by the European Commission, which contains a catalogue of available courses across Europe. While some of its courses target the general public, others are directed specifically at teachers or high-level managers of companies.

[4] For more information, see: https://www.fit4internet.at/page/course.
[5] For more information, see: https://portugaldigital.gov.pt/en/training-people-for-digital/available-training-in-digital-skills/portugal-digital-academy/.
[6] For more information, see: https://www.hetinformatiepunt.nl/.
[7] For more information, see: https://digiskillsbelgium.be/.
[8] For more information, see: https://digitalizateplus.fundae.es/digitalizate/1.
[9] For more information, see: https://eskills.org.mt/en/Pages/Training-Opportunities.aspx.
[10] For more information, see: https://digital-skills-jobs.europa.eu/en/opportunities/training.

4.2. Virtual providers

Virtual providers – as opposed to aggregators – not only provide information and links to courses or providers, but are directly involved in the provision of adult digital skills through a combination of application processing, selection and/or funding. They are frequently publicly run and/or funded. In these cases, they can be a cost-effective way of involving public quality assurance and funding while also providing choice for learners and avoiding the need for the PES or other government bodies to become providers themselves (though in some cases, it does also directly provide them).

A good example to begin with is **PortálDigi**[11] ('Digiportal' in Czech), operated under the auspices of the Czech Ministry of Labour and Social Affairs and funded by the ESF. It is a closed platform developed specifically for the improvement of the digital competences of employees and employers (and containing other services besides digital training modules). It contains a number of courses specifically aimed at digital competences, structured by the type of competence and/or type of job role. The modules can also be downloaded and integrated into any Moodle (an open-source learning management system) free of charge, thus facilitating their incorporation by employers into their own learning management system (LMS).

In Greece, the **National Academy of Digital Skills**[12] provides free online training for digital skills in a number of domains, with almost 300 modules available. These include courses aimed at citizens who lack the most foundational digital skills, as well as those who aim to become ICT specialists.

TRIO[13], also funded by the ESF, is a project by the Tuscany Region in Italy to create a platform for digital training courses and services for lifelong learning and professional training, available to everyone. It contains more than 200 courses for digital competences out of approximately 900 learning objects. It provides tutoring and technical support.

A good example of a larger system that is fully focused on digital skills is **Pane e internet** ('Bread and internet')[14] – a regional initiative of the Emilia-Romagna regional government in Italy, active since 2009. Its overall objective is to develop "the digital competence of citizens through a training path that goes from digital literacy to the acquisition of a broad vision of digital in the life of everyday (digital culture)". Among its activities, it directly provides digital skills training for beginners as well more advanced users and trainers. The courses for beginners (called 'alphabetisation' courses) have small class sizes of 12-15 people and have an average duration of 16 hours, while more advanced courses can accommodate larger groups and are more differentiated in their structure.

An interesting twist on the notion of the virtual provider is France's **Pix portal**[15]. It was created by the French government in 2016 as a non-profit organisation bringing together a number of public actors, whose mission is to support the improvement of the general level of digital skills. The portal itself does not contain any specific digital skills courses, but it encompasses a broad spectrum from assessment through skills development to certification. Skills development is achieved through specific challenges for users, as well as the Pix Pro service – a platform for companies and training organisations to develop their digital skills modules.

[11] For more information, see: https://portaldigi.cz/.
[12] For more information, see: https://nationaldigitalacademy.gov.gr/.
[13] For more information, see: https://www.progettotrio.it/.
[14] For more information, see: https://www.paneeinternet.it/.
[15] For more information, see: https://pix.fr/.

Like Pix, the newly launched Dutch **STAP**[16] (*Stimulering Arbeidsmarkt Positie)* programme demonstrates how real-life provision blurs boundaries. It provides a subsidy of EUR 1,000 to each lerner to cover the costs of a course or training programme. It is open to anyone of working age living in Netherlands who has an EU citizenship (or a partner who is an EU citizen). This would seem to indicate that, as a mechanism purely for funding, it should not be classified as a virtual provider. However, the desired course or training programme must be recognised by the government in the *STAP-scholingsregister* ('STAP training register'), and individuals access the courses through a STAP portal.

While these examples come from the public sector, there is also a smaller number of private sector training portals that rely on digitalisation of delivery and contain a number of courses focusing on medium-level digital skills.

A good example is **Karriere Tutor** ('Career Tutor')[17] in Germany, which offers more than 700 online courses in various subject areas, combined with applicant coaching and careers advice. It also has a specific upskilling track focusing on digitalisation careers, as well as one for aspiring ICT professionals. Karriere Tutor appears to be driven by use of public funding (from public employment services and other projects).

4.3. Place-based networks of providers focusing specifically on digital skills

It is relatively straightforward to provide digital skills training using the digital medium itself – and if it is done in automated manner, it can also be easy and cost effective to scale up. However, this approach is constrained by two factors. First, those who lack digital skills are unlikely to even start to use using such training resources; and second, when they do, they tend to have a huge attrition rate. Hence, preference among authorities for digital skills activities that combine:

- Place-based training/assistance, such as at libraries, dedicated centres and other public access points;
- A large number of easily available volunteers who can be purpose-trained young people or information science professionals (e.g. librarians);
- The ability to get people over the basic barrier/threshold of digital literacy, and then helping them to develop further.

Usually, the purpose of these initiatives is to go wide rather than deep. In other words, their aim is to involve as many people as possible in taking their first steps in the area of digital skills, especially groups that would not otherwise do so and would remain digitally excluded. A good example, open to wider society in Portugal, is **I Am Digital**[18], which has very high quantitative objectives for a country of 10 million people, namely: "to prepare 30,000 volunteers so that they can provide basic digital training, and create 1,500 digital skill training centres in partnership with local authorities and organisations throughout the country." The project is implemented by A2D Consulting and funded by Caixa Geral de Depósitos (a Portuguese state-owned banking corporation, and the second largest bank in Portugal).

[16] For more information, see: https://www.rijksoverheid.nl/onderwerpen/leven-lang-ontwikkelen/leven-lang-ontwikkelen-financiele-regelingen/stap-budget, https://www.stapuwv.nl/p/voorportaal.
[17] For more information, see: https://www.karrieretutor.de/.
[18] For more information, see: https://portugaldigital.gov.pt/en/training-people-for-digital/available-training-in-digital-skills/i-am-digital/.

Similarly, the **Prisijungusi Lietuva**[19] (Lithuania Online) project focuses on a large national target group of the population, consisting of 500,000 people who are still not using the internet or whose digital skills are inadequate (in a country of less than 3 million). To achieve this objective, the project has focused on developing a network of 2,000 'e.scouts' (volunteers), as well as involving 1,200 librarians to assist individuals at library-based public internet access points.

In both Portugal and Lithuania, the initial focus of these projects has been on providing training in basic internet skills such as email, the use of digital public services, and access to services such as internet banking or social networks. Therefore, they are at (or below) the lower boundary of the digital skills spectrum examined in this report. However, these projects are relevant for two reasons – their very broad reach and, even more importantly, the ease with which they can be developed to provide more sophisticated digital skills. For example, the Lithuanian project has quickly developed to offer training on issues such as personal cybersecurity or spreadsheets.

An interesting example of place-based strategies aimed at deeper intervention are the **Innovation Labs and Digital Gyms** in the Veneto Region of Italy, where the regional government had funded 10 Innovation Labs and 106 Digital Gyms spread across 96 municipalities. These serve as bases for many activities, with a prominent role for training that ranges from 'digital citizenship' events to highly sophisticated data science courses. Its target group is the general population. In Italy, such local and regional initiatives have now inspired a national programme called the Digital Civil Service, funded from the RRF and already in operation.

4.4. Repurposing networks of existing training institutions

The examples of networks in the previous section come from programmes developed specifically in the digital era and which focus on the provision of digital skills. Another option is to repurpose networks of existing adult training institutions to incorporate these new types of skills.

Finland provides an example of repurposing and opening up of education content developed for various target groups. A network of universities of applied sciences is building a system of shared digital all-year courses offered via the **'eAMK – The new ecosystem of learning'**[20] project (2017-2020), funded by the Ministry of Education and Culture. This is not limited to digital skills, but provides a significant number of courses that involve digital skills. Both the physical and digital offerings are intended not just for regular students but also, as a part of the open university programme, for everyone regardless of education and age. The available courses in digital skills range from overall introductions to digital competences all the way up to coding in specific languages.

4.5. Digital skills programmes aimed at workers (employed and/or unemployed)

Public support for the acquisition of digital skills specifically for the employed or the unemployed is often achieved through the funding of employer-based programmes, funding individual learning through vouchers or learning accounts, or by creating platforms that connect individuals and enterprises to specific providers. However, this section first looks at examples of major training programmes that are aimed at employed individuals and which provide the direct acquisition of skills at an individual level. Such programmes

[19] For more information, see: https://www.prisijungusi.lt.
[20] For more information, see: https://campusonline.fi/en/; https://tki.centria.fi/educationcalendar/continuing-education.

may be a part of overall lifelong learning initiatives delivered digitally (but not providing solely digital skills), or may focus specifically on digital skills.

Looking at overall LLL initiatives that are both delivered digitally and contain a significant digital skills component, Latvia's **Macibaspieaugusajiem** project[21], funded by the ESF and run by the State Education Development Agency (VIAA), is a good example of one that focuses on employed individuals. Through its portal, all employed and self-employed residents can apply for training if they are above 25 years of age, including working pensioners, young parents on parental leave and those in an employment relationship. The actual training is provided by independent providers, but application and funding happens through the project, so it is much more than just an aggregator. The project supports in-depth training, and examples of courses in digital skills include digital marketing, 3D digital modelling, and the programming of computerised equipment (CAD/CAM). However, due to the nature of the funding and organisation, the training takes place in rounds rather than continuously. The latest (seventh) round of European Union (EU) funding in February 2022 received more than 36,000 applications.

A similar programme, but one that focuses more on digital skills, is run by the Spanish Public Service of Castilla y León – an autonomous body in charge of activities in the region to promote employment, training for employment and guidance, and intermediation in the labour market. '**Programas de formación en competencias digitales para trabajadores ocupados en la Comunidad de Castilla y León para los años 2021 y 2022'**[22] is open to any self-employed or employed person. Like the Latvian project, it functions as a platform through which courses can be found and applied for, with the agency paying the costs for those who are approved.

Digital skills programmes for the unemployed are often further targeted by age, being aimed most frequently at young people; however, there are examples of more generally oriented ones, such as **Upskill**[23] in Portugal. This is a professional requalification programme in digital technologies aimed at unemployed or underemployed people, which started in 2020. It is a multi-institutional project coordinated by the Portuguese Association for the Development of Communication (APDC). The actual training is mainly offered by higher education institutions and takes several months, covering specific areas such as Java programming, Python, cloud platform management or low-code programming. This is followed by three months of training in a business context. Companies commit to hiring at least 80% of the trainees who successfully complete the training and pass the interviews. The programme has a target of 3,000 graduates and is currently available in nine of the 18 regions of Portugal.

4.6. Bottom up, demand-led initiatives

There is no limit to what public and private organisations can decide to do for digital skills, be it a comprehensive programme or a single course. From this potentially infinite sample, the report offers a small number of examples to illustrate possible approaches:

- Programmes and projects for vulnerable groups – e.g. youth, older, women, refugees;
- Programmes and projects for specific professions, such as professionals in ICT, health, teachers and public administration.

[21] For more information, see: https://www.macibaspieaugusajiem.lv/.
[22] For more information, see: https://empleo.jcyl.es/web/es/quiero-formarme/programas-formacion-competencias-digitales.html.
[23] For more information, see: https://portugaldigital.gov.pt/en/training-people-for-digital/available-training-in-digital-skills/upskill/.

Provision of such activities can be organised and funded by public, business or NGO actors or through partnerships.

Youth is one of the most frequent target audiences of digital skills programmes, particularly NEETs or unemployed youth. Such an approach is particularly popular among Member States in Southern Europe, where the contrast between high youth unemployment and lack of digitally qualified workers is particularly stark. Such initiatives are also frequently run or funded by private companies rather than public authorities.

Two innovative examples from the private sector in Italy are **Academy Rapido**[24] and **Crescere in Digitale** ('Growing in Digital')[25]. The former focuses on enabling young NEETs or disadvantaged young people to become digital professionals such as junior web developers, digital marketers, data scientists and IT support workers. While the technical content of its courses has been acquired from partners, Academy Rapido has integrated these existing courses into its platform, enhancing them using its own methodology, with the aim of reducing the dropout rate and making them more engaging and appropriate for the purposes of employment.

Crescere in Digitale is a public-private partnership that provides training in the latest digital skills more broadly to young unemployed people in Italy, and matches them with local businesses. Crescere in Digitale is implemented by Unioncamere (Italian Union of Chambers of Commerce) in partnership with Google, but is also supported by the National Agency for Active Labour Policies, supervised by the Ministry of Labour and Social Policies.

These two examples also show that such initiatives can focus not only on coding skills, as the Rapid Academy does (an approach also followed by BeCode in Belgium), but can also include digital skills more broadly. This route is also taken by the **Digital Marketing Vocational Training Programme**[26], an upskilling initiative by the Greek National Alliance for Digital Skills and Employment and Google Hellas that offers unemployed young people (up to 29 years old) training in digital marketing and digital work skills, including website creation, SEO and SEM (search engine optimisation and management), skills for business development, social media, content marketing and crisis management, as well as an introduction to data analytics platforms (via Google Analytics). This course includes 74 full hours of training, certification, and subsidised work experience.

Of course, both of the approaches mentioned above can be combined together, as is the case with the **More Digital Youth programme**[27] in Portugal or **Telerik Academy**[28] in Bulgaria.

For **older workers**, a substantial number of measures are aimed at upskilling and reskilling of older individuals with digital skills, but these usually focus on individuals above the age of 65, and are thus beyond the remit of this report. However, a few examples exist of initiatives aimed specifically at working people aged 45 or above. A project going by the lengthy name of **Equal Opportunities in Digital Poland – The Lighthouse Keeper 50+**[29], run by the Ministry of Administration and Digitisation and the 'Cities on Internet' Association (as an nongovernmental organization, the objective of which is

[24] For more information, see: https://www.academyrapido.com.
[25] For more information, see: https://www.crescereindigitale.it/.
[26] For more information, see: https://digital-skills-jobs.europa.eu/en/inspiration/good-practices/digital-marketing-vocational-training-programme.
[27] For more information, see: https://portugaldigital.gov.pt/en/training-people-for-digital/available-training-in-digital-skills/more-digital-youth/.
[28] For more information, see: https://www.telerikacademy.com.
[29] For more information, see: https://latarnicy2020.pl/.

the development of Information Society at regional level) has a broad focus on improving the digital literacy of its target group. Under the programme, a 'Lighthouse Keeper' is a person who is first trained and familiarised with ICT skills, and later becomes an ICT teacher for digitally excluded adults aged 50+. The project is a positive example of a successful operation that has been retained and expanded – it has operated continually since 2006, and has so far involved tens of thousands of individuals. In Germany, the federal government has supported a similarly targeted initiative, **IT 50 plus**, which was conducted in collaboration with the ICT business association BITKOM and the national metalworkers' union.

For **women,** the **Czechitas – New Generation**[30] based in Czechia serves a dual objective – to increase the number of girls and women participating digitally, and to enhance the digital competences of a new generation of young people. The range of activities, delivered through its website and six regional/local centres, is broad, but prominently includes short online courses on different tech topics (programming, website creation, data analytics, cybersecurity) as well as a three-month Digital Academy resulting in a professional qualification.

The **DesArrolladoras (Developers)** programme[31] is also a good example not only of a measure targeting women, but also of a programme run by the corporate sector. Created as a CSR initiative by Samsung in Spain, it began with a small pilot in 2018. Over subsequent years, it has grown into a project that combines a shorter (50-hour) online introductory course teaching the basics of coding to women without previous experience, with successively longer and more challenging courses that are available to successful graduates of the previous stages. More than 1,000 women has so far taken part.

For **refugees**, the **SaorEd**[32] programme in Ireland provides free access to a wide range of courses to applicants for international protection and other underserved communities in Ireland. The IT Skills study track covers basic digital skills (in English and Arabic), intermediate IT skills, as well as more advanced courses such as web design using HTML, CSS and JavaScript.

Digital skills initiatives targeted at **professionals are mostly aimed at those in the areas of health, education and IT**, although there are exceptions.

BeCode[33] in Belgium is a good example of a private initiative that targets the unemployed, but is quite open with regard to who can access it. Highly focused in the type of digital skills it provides (coding skills), BeCode was founded by a group of individuals in Brussels in 2016 as a not-for-profit. Using both private and public funding (including social impact bonds), it has now grown to five campuses around the country. Its focus is on close collaboration with employers, providing participants with a high degree of confidence that good performance can lead to employment. Its core courses focus on IT professions that can be taught within several months and have a guaranteed job pipeline, such as junior web developer or cybersecurity analyst.

While this report generally eschews specialised courses for high level ICT professionals, the Swedish project **Expertkompetens**[34] is included due to its innovative nature. It is a private programme by the Knowledge Foundation (KK-stiftelsen) that is designed to support businesses interested in further upskilling their employees. This initiative targets

[30] For more information, see: https://www.czechitas.cz/.
[31] For more information, see: https://digital-skills-jobs.europa.eu/en/inspiration/good-practices/desarrolladoras-developers.
[32] For more information, see: https://saored.com/.
[33] For more information, see: https://becode.org/.
[34] For more information, see: https://www.kks.se/vart-erbjudande/vara-program/expertkompetens/.

ICT professionals and other digital experts who are looking to build further digital competences.

Teachers and trainers are the target group of several programmes such as **My Latvija.lv! Do Digitally!**[35] in Latvia, or Mehackit, which runs internationally. **My Latvija.lv! Do Digitally!** was launched in 2018 by the Latvian government to encourage society, including businesses, to use government e-services and to ensure that the widest possible population is informed about the online services offered by the government. As a part of the programme, 6,000 Digital Agents have been trained, including 1,444 librarians, 1,521 teachers and more than 2,603 state and local government employees as well as 376 court staff, 40 different non-governmental organisations and 16 journalists. **Mehackit**[36] provides training in creative technology for phenomenon-based teaching in support of free learning materials. Its practical and inspiring training provides pedagogical skills in creative technology, programming, project-based learning and the use of digital learning materials in the classroom.

Digital skills for healthcare are the focus of both national and international initiatives. The **Digital Skills in Healthcare**[37] initiative (Digivaardig in de Zorg) is a Dutch collection of online learning resources that, among other things, enhances the digital skills of health care professionals by providing courses, certification and also appointing a 'Digicoach' and 'I-nurse' within each establishment. Topics of the courses include e-Health, technological applications, information security and privacy, and automation in the context of the care home. A good example of an initiative covering several countries is **Secure Hospitals EU**[38]**,** funded by the Horizon 2020 programme. This initiative provides training courses in digital skills and cybersecurity awareness for professionals in the fields of medicine and healthcare. Its courses are available in several Member States (including Austria, Germany and the Netherlands) through the SecureHospitals.eu online school for medical practitioners. More than 100 training courses from different providers have been offered via the initiative in 14 languages.

In Italy, the **Competenze Digitali**[39] programme aimed at public administration is already being implemented as a part of the country's RRP. Civil servants based in participating institutions can receive training in five areas, based on self-assessment (data, information and IT documents; communication and sharing; safety; online services; and digital transformation).

One of the most specifically targeted projects in this report is **Explore**[40] in the Republic of Ireland. This focuses on low-skilled workers aged 35 and over in manufacturing employment with low levels of engagement in lifelong learning, and is aimed specifically at improving digital skills. It is also personalised – individual plans are drawn up for all participants, who receive four days of training both on- and off-site over four weeks. After a successful pilot in 2018, it has been expanded across Ireland.

4.7. Conclusion

This chapter, which surveys programmes and projects focusing on digital skills for adults, showed that the relative paucity of academic and grey literature on specific initiatives is

[35] For more information, see: https://digital-skills-jobs.europa.eu/en/inspiration/good-practices/my-latvijalv-do-digitally.
[36] For more information, see: https://mehackit.org/en/.
[37] For more information, see: https://www.digivaardigindezorg.nl/.
[38] For more information, see: https://project.securehospitals.eu/.
[39] For more information, see: https://www.competenzedigitali.gov.it/.
[40] For more information, see: https://www.regionalskills.ie/explore.

not due to a low number of potential subjects. On the contrary: there is a vast ecosystem out there, although it is highly uneven between countries and target groups.

The chapter has documented examples of projects and courses aimed at a variety of target groups. While the many bottom-up initiatives presented in this chapter expand the adult digital skills offer, their very number and diversity makes the process of choosing the right course lengthier and more difficult.

However, even in countries with plethora of options, the challenge of accessibility exists. As the Dutch government states in its Digitalisation 2.0 strategy, for countries that have a lot of providers and content, the challenge lies rather in its integration and accessibility. This challenge tends to be addressed through the creation of aggregators and virtual providers, generally at a national level and using public funding. These span a broad spectrum from providers of information, through funders, to organisers of training activities. However, they exist only in a minority of Member States and regions (e.g. Portugal, Czechia, the Netherlands, France, Greece, Belgium, Austria, some Italian regions).

This is also confirmed by a small exercise conducted as a part of the study team's efforts to gather primary materials – searching for Google results using the terms 'digital skills' and 'improve digital skills' in national languages, and then following the first 20 links. Usually, this leads to various blogs, articles or websites for very specific projects, but not to a broadly accessible pathway towards digital skills for a range of individuals.

In addition to digital gateways, there exists a parallel physical track of place-based providers. Even though such networks tend to provide basic digital skills, in most cases they also provide more advanced knowledge, as well as an alternative point of access to digital skills compared with the virtual pathways.

5. Conclusions

This report has been prepared for DG EAC to provide **a focused review of the literature published since 2018 regarding the provision of digital skills to adults in Europe.** It looks at the provision of mid-level digital skills in which courses or programmes are either work-based or provided in a non-formal and informal context, and targeted at adults of working age.

The report concludes that while the number of papers on the subject is substantial and growing, their utility for policy-relevant analysis is somewhat limited. To put it succinctly – **the literature has been poor on the subject of provision, but rich on other aspects of adult digital skills**.

An overview and classification of the available information on policies for adult digital skills development demonstrates that such policy approaches and initiatives have usually been articulated through general strategic documents on digitalisation, even though countries have increasingly developed specific digital skills strategies. In terms of content, **individuals are most often targeted as both citizens and workers,** with governments being concerned with endowing them with the skills needed for societal and economic transformations. Policymakers have paid particular attention to the inclusion of those lacking digital skills while also focusing on cross-sectional inequalities (e.g. the gender divide and low SES). The delivery of digital skills is achieved through training institutions, employers, or support for individual actions, with most countries pursuing a multi-pronged approach that combines at least some of these. Increasingly, there has been an introduction of individual pathways supported by vouchers, individual learning accounts and similar approaches.

Forward-looking changes in relation to the digitalisation of the economy and the related acquisition of digital literacy have been central to the Recovery and Resilience Plans of the Member States. The improvement of adult digital skills is present in nearly all of these national plans, but the extent of its importance differs. Common themes include an **upgrade of the policy framework, support for demand-based upskilling** through individual empowerment, and the **use of public employment services to fund investment in both the employed and the unemployed**.

The overview of specific programmes and projects focusing on digital skills for adults demonstrates that there is a vast ecosystem out there, although its size and variety are uneven between countries and target groups. Furthermore, the **options available are not accessible to everyone, and tend to benefit those that already possess a certain level of digital literacy**. In addition to digital modes of delivery, other **offline options for digital skills training** exist, such as through libraries or the repurposing of existing adult skills programmes. These offline options aim to target those taking their first steps in the area of digital skills, especially groups that would not otherwise do so, and would thus remain digitally excluded.

However, while there is an abundance of programmes and initiatives of various types, there has been a **lack of comprehensive mapping of provision**. This is accompanied by scarce evidence on the impacts and relative cost-effectiveness of policies and interventions. This has led to the absence of identified best practices or models for the provision of adult digital skills.

Given the significant resources poured into the area, as well as its increasing importance to both citizenship and competitiveness, policymakers at both EU and national levels should invest more into understanding the topic and developing a set of good practices that could, with adjustments to national circumstances, be rapidly spread across Europe. This is **an**

important area for future research, and requires a related infrastructure to foster data collection, as well as a greater focus on impact evaluation to understand its effects in both the short and long term.

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