



# Closing the Digital Skills Gap: Unveiling Insights from Four Countries

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## INTRODUCTION

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Just decades ago, the internet was an entirely new concept, but it's become second nature for billions of people and is now embedded into daily life across the world. While the internet is old news, there are recent technologies like blockchain, artificial intelligence (AI), and the cloud that have gone from niche, specialized roles in the global economy to the mainstream. This rapid and widespread digitalization has changed the nature of work, and as a result, digital skills are now regarded as essential for the modern workforce — across Europe and the U.S., job requirements for digital skills have gone up by 50%.<sup>1</sup>

While this transformation has been underway for decades, the pandemic accelerated it. Not only did the crisis change how businesses operate and the way we work, but it also influenced people's reliance on technology. Individuals and businesses were suddenly dependent on the internet, their smartphones, and their mobile applications for critical daily activities like work, shopping, and communication with loved ones. A 2022 report from PPI found that the App Economy became an increasingly indispensable part of the U.S. economy during the pandemic. Existing mobile applications were able to respond to soaring demand without significant outages and app developers were also able to quickly create new apps to meet the human and economic needs.<sup>2</sup>

Additionally, this year's World Economic Forum Jobs report — which lifted up perspectives from 803 companies that collectively employ more than 11.3 million workers across 27 industry clusters and 45 economies across the world — found that technology adoption will remain a key driver of business transformation for the next five years, with over 85% of organizations identifying that increased adoption of new and frontier technologies and broadening

digital access will be priorities for their organization.<sup>3</sup> Eighty-six percent of companies surveyed also stated that digital platforms and apps are the technologies most likely be incorporated into their operations in the next five years.<sup>4</sup>

It's clear the reliance on technology from individuals and business is not going away anytime soon and will continue to grow as emerging technologies and solutions are developed and adopted. To keep pace with this demand – while also ensuring business has the skilled talent to remain competitive – digital and tech-related skills will be increasingly necessary for workers to succeed in the global labor market.

While demand for digital skills is growing, unfortunately supply is lower than it needs to be. Workforce shortages persist across the tech industry with employers struggling to find skilled talent that is prepared for digital roles. And this gap continues to widen. A 2021 Rand Corporation report found that the global digital skills gap was widening due to the following factors: tech talent outpacing an already short supply (in fact, 54% of American workers believe technology will advance faster than workforce skills)<sup>5</sup>; high costs and disorganized approaches to traditional education that increase barriers to learning; access to digital infrastructure and skills limited by socio-economic status (76% of global workers don't feel they have the resources needed to learn digital skills).<sup>6</sup>

These findings highlight the barriers confronting workers who want to acquire digital skills. The report also estimates that because of digital skills gaps, 14 of the G20 countries could miss out on \$11.5 trillion in

cumulative GDP growth.<sup>7</sup> Policymakers around the world need to tackle this problem, both to ensure their industries and businesses can keep pace with the rate and scale of technological innovation, but also to ensure current and future workers will have more opportunities to develop the skills needed to succeed in changing labor markets.

## FOUR COUNTRIES EFFORTS TO ADDRESS DIGITAL SKILL DIVIDES

This paper examines four countries that are grappling with the digital skill divide challenge: the United Kingdom, France, Germany, and Italy. It documents their tech industry growth and highlights pragmatic responses to the challenge of ensuring their workforces are better prepared for in-demand employment.

### The United Kingdom

The U.K.'s tech industry growth is exponential. Since the government launched its first Digital Strategy in 2017, the U.K. tech sector has boomed, growing over two and a half times faster than the economy as a whole.<sup>8</sup> As Europe's leading digital hub, the U.K. tech sector raised more private capital and saw more public listings than any EU country in 2021.<sup>9</sup> This tech boom is also seen through the growth of the U.K.'s app economy. Recent research from PPI found that as of May 2023, the U.K. App Economy includes an estimated 667,000 jobs. This figure is up some 75% since before the pandemic.<sup>10</sup>

As a result of this growth, over 80% of all jobs advertised in the U.K. now require digital skills. Nonetheless, employers complain of a paucity of available talent.<sup>11</sup> Estimates

suggest this digital skills gap is costing the U.K. economy as much as £63 billion a year in potential GDP.<sup>12</sup> Contributing to this gap is the lack of digital skills exposure in the U.K.'s education system. Research published last year by KX, a real-time data analytics firm in the U.K., found that despite the growing importance of digital skills and the popularity of coding, 43% of students say it is not taught in school.<sup>13</sup> The KX survey also found in existing STEM (science, technology engineering, and math) education, male students outnumber their female counterparts.<sup>14</sup> According to the report, 51% of male students can already write or are planning to learn a computer programming language at some point, versus only 36% of female students.<sup>15</sup>

While the tech sector in the U.K. is booming, it cannot sustain this progress without a digitally skilled workforce. To address the skill needs of workers, while also ensuring these opportunities are expanded to more individuals, including women, the U.K. is championing the following initiatives:

### **1. A Unified Government Vision & Establishment of a Digital Skills Council:**

Last year, at the start of London Tech Week, the U.K.'s updated Digital Strategy launched.<sup>16</sup> The strategy brings cross-government tech and digital policies together in one unified roadmap for ensuring digital technology and infrastructure drive economic growth. The strategy includes the launch of a new Digital Skills Council. The Council brings together tech leaders from Starling, Amazon web Services, Multiverse, and more to tackle issues related to the digital skills gap and large-scale computer processing

capabilities, vital for powering technologies of the future such as AI. This public-private partnership will encourage industry plays a vital role in informing tech policy in the U.K. as well as ensuring their involvement and investment in training workforces and inspiring the next generation of talent from a wide range of backgrounds to consider digital careers.

### **2. Scholarships to Advance Digital Skills:**

In February of 2022, the U.K. government announced up to 2,000 scholarships to ensure the U.K. has the advanced digital skills needed to maintain the country's leading position in cutting-edge AI and data science.<sup>17</sup> The Office for Students allocated up to £23 million to universities to fund scholarships starting this year. Funding will be available for students from low socioeconomic backgrounds as well as Black, women, and disabled students to ensure the AI built and used in the U.K. reflects the make-up of their communities. To date, the government has awarded up to £8.17 million to 30 higher education providers to support the delivery of 817 scholarships this year, each worth £10,000.<sup>18</sup>

### **3. The Apprenticeship Levy:**

While not directly targeting digital skills, the U.K. has a robust apprenticeship program that seeks to solve workforce shortages across an array of industries, with large implications for the tech sector. The apprenticeship levy, which started in 2017, is paid by large employers with a payroll of over £3 million. Currently, only 2% of employers pay the levy, which is set at a rate of 0.5% of their total annual payroll.<sup>19</sup> Every employer who pays the levy has a digital account where they

can access their levy funds to spend on apprenticeship training. Smaller employers – those with a total annual pay bill of less than £3 million – pay just 5% of the cost of their apprenticeship training and the government pays the rest.<sup>20</sup> Levy funding can only be used to invest in high-quality apprenticeships and funds almost 650 different types of programs. Since being introduced, the levy has directly supported almost 313,000 people in getting the skills and work experiences needed for in-demand employment.<sup>21</sup>

## France

France is now the second most important tech ecosystem in Europe, with Paris ranking just behind London and ahead of Berlin.<sup>22</sup> France has seen tremendous growth in their tech sector since the onset of the pandemic. Research from PPI finds that France's App Economy includes 611,000 jobs as of May 2023, which is up 41% from the pre-pandemic estimate. A notable example of this expansion is the popular app BeReal.<sup>23</sup>

In 2018, France developed a National Plan for Digital Inclusion to support the digital transformation of businesses as well as the development of a safe and "human-centric" digital society. The plan seeks to support and train 1.5 million people in topics relevant to digital technology and 21st-century competencies to combat the digital divide. Its long-term goal is to help at least 4.5 million people acquire basic digital skills over the next 10 years.<sup>24</sup>

In addition to the national plan, which has acted as a north star for French policymakers, here are other related initiatives:

**1. Development of Digital Commons:** The French Ministry of Education published its Digital Strategy for 2023-2027 earlier this year. As part of its "digital commons" strategy, the Ministry offers community ownership of technology and related resources in schools to benefit students, parents, and teachers.<sup>25</sup> The program allows students and teachers working on digital and technological science to create and share information and knowledge resources to learn and practice collaboration and develop stronger digital skills through project-based work. The general strategy has four main objectives: to strengthen national and local cooperation between education stakeholders; develop students' digital skills; provide teachers with a clear offer of digital tools and resources; and develop secure, accessible, quality, and environmental responsibility IT tools.

**2. Grandes écoles du Numérique:** The Grande Ecole du Numérique (GEN) is a public interest group made up of the French government and three companies: Caisse des Dépôts, Société Générale, and Orange.<sup>26</sup> It aims to respond to the growing need for digital specialists by promoting skill development opportunities and professional network-building for people who have limited access to employment, in particular young people, women, and people in urban and rural areas. To ensure these opportunities are available, GEN offers: a search engine to make digital training more visible (you can access a catalogue of more than 15,000 training courses); GEN SCAN which identifies what skills are needed by different companies, across the country; and GEN accreditation of excellence which is awarded to the highest quality and most

effective digital programs. GEN offers 8 months of training on average and has served 39,233 learners since 2016.<sup>27</sup>

**3. Pix:** Founded in 2016, Pix is a nonprofit, French-based public organization aiming to improve digital literacy across the globe. Pix is a universal, free, and open-source online service for assessing, developing, and certifying digital skills.<sup>28</sup> Users can take online tests, join a certification session, and receive a digital badge – helping them to translate and leverage their skills in the labor market. The system is connected to the French program for the recognition of prior learning, CléA, which ensures that the digital skills acquired are recognized nationally. What also is unique about Pix is that it was co-constructed over four years by teachers, students, and other professions. Any user can suggest improvements to ensure it is keeping pace with modern and immediate skill needs.

## Germany

On track with the U.K. and France, Germany's tech market is thriving – the industry is expected to reach a value of \$133.03 billion by 2026.<sup>29</sup> This is due to the investment in tech venture capitalism at the national level and in major cities across Germany. In the last quarter of 2022, tech job postings in Germany exceed those in other European countries by over 300% on average.<sup>30</sup> Additionally, specific to the app economy, Germany now holds 633,000 app-related jobs. This is up 38% from pre-pandemic estimates.<sup>31</sup>

While Germany's job market thrives, the country lags many nations in terms of skilled talent. In the European Commission's 2022

Digital Economy and Society Index (DESI), Germany ranked below the EU average for the prevalence of digital skills. It found that 49% of Germans had “at least basic” digital skills, compared to an EU average of 54%.<sup>32</sup> For “above basic” digital skills, the DESI found that just 19% of the German population qualified, compared to a 26% EU-wide average.<sup>33</sup>

This gap is partly due to Germany's widening digital divide caused by the pandemic.<sup>34</sup> When learning and work went virtual, those who already had good digital skills were able to continue learning and further grow their expertise. However, those without those skill sets usually dropped out of learning activities altogether or had significant problems keeping pace with their peers. German leaders also faced significant challenges reaching those with the most need due to the lack of digital infrastructure (poor internet connection, no access to digital devices, etc.) in certain areas of the country.<sup>35</sup>

To address the stark digital divide in Germany, equip young and adult learners with the skills needed for success in the labor market, and keep pace with the growing tech sector, Germany has established the following programs and policies:

### 1. Germany's Strategy for Digital Education:

Germany's Digital Strategy 2025 describes the priorities of the German Government, for enhancing the nation's digitalization process. A key pillar of the Strategy is Digital Education. The Digital Education pillar seeks to ensure every young person has basic knowledge of information science, teachers are better prepared to teach these skills, and digital learning is

embedded in the curriculum. This effort is strengthening digital skills at around 43,000 schools in Germany. The strategy also includes initiatives to support universities, companies, and adult education institutions in providing digital trainings. In total, there are 20 projects and 83 implementation steps in the field of digital education. In 2021, the Federal Ministry for Economic Affairs published a status update and stated 89% of digital skill endeavors were completed or in progress.<sup>36</sup>

**2. Komm, Mach MINT:** Come do STEM is a program that seeks to expand STEM-related courses and jobs for young girls and women.<sup>37</sup> The aim of the initiative is to get women interested in these high-demand opportunities to solve existing labor shortages and close gender gaps in these fields. The program offers a realistic picture of STEM professions and promotes innovative ways to explore these pathways through independent research, problem-solving, and laboratory investigations as well as on the job training and career experiences. To ensure success, the program requires partnership between secondary education, postsecondary education, the private sector, and the community.

**3. Paid Training Leave:** Through the Continuing Education and Training Act, which was introduced earlier this year, the German government introduced a paid leave program for employees to undergo training. Labor Minister Hubertus Heil said that the policy would offer paid educational leave for up to a year, building on similar models, that have been implemented elsewhere in Europe, like in Austria. During the training

period, workers would be able to take time off from work to reskill and/or upskill to learn new skills that are needed for in-demand work. Sixty percent of workers' wages will be funded by the federal government or 67% for those with children.<sup>38</sup> While measures intended to upskill the national workforce have so far focused on unpaid education or apprenticeships, which are typically undertaken by younger people, the planned paid leave policy will target mid-career professionals. The cost of the Continuing Education Act for the Federal Employment Agency will amount to around €771 million annually until 2026. €190 million would be added from the federal budget, which would be offset by social security contributions and tax revenues from the creation of employment.<sup>39</sup>

## Italy

Italy, the birthplace of the Renaissance, is also making a name for itself in the tech industry. In recent years, developers in Italy have seen significant growth in web frameworks, game development, and mobile app development. Similarly to the U.K., Germany, and France, Italy is grappling with the changing nature of work and the rapid evolution of the country's economy.

While more than 80% of Italians use the internet, more than 54% of people still lack basic digital skills.<sup>40</sup> What's worse is despite the increase in remote work and distance learning, 3 out of 10 Italian households in 2021 still did not have access to a PC and/or a stable internet connection.<sup>41</sup> This creates significant differences in digital knowledge that are pronounced across regions, with

southern regions scoring lower than their northern counterparts.<sup>42</sup>

Italy's leaders have not stood still and are working tirelessly to bridge these gaps and create more opportunities in the tech sector across the country. Through developing a National Strategy for Digital Skills, the country has charted a well-defined strategic path where basic and advanced digital skills are now cornerstones of the Italian government's education and social policy.<sup>43</sup> Through these public efforts as well as innovative private models, Italy has enabled strategies to address these challenges more effectively at scale:

### 1. Italian Coalition for Digital Skills and Jobs:

In April 2020, the Ministry for Technological Innovation and Digital Transition launched the Italian Coalition for Digital Skills and Jobs. The coalition is a multi-stakeholder initiative that promotes digital skills across Italy. The initiative aims to identify and engage as many stakeholders as possible (i.e., businesses, public entities, NGOs etc.), to live into Italy's digital transformation and ensure every Italian has the digital skills needed to succeed in the new economy. More than 180 organizations have joined the Coalition and they have launched more than 220 projects. In 2020, the initiative of the National Coalition for Digital Skills trained more than 2.7 million students, 70,000 teachers, over 90,000 citizens and more than 250,000 workers from both the private and public sectors.<sup>44</sup>

**2. The Developer Academy:** Through a partnership with Apple, Italy's Università Degli Studi Di Napoli Federico II offers The

Developer Academy. The Developer

Academy is aimed at developing apps and focuses on software development, startup creation, and app design with an emphasis on creativity and collaboration to empower and equip students to develop the skills needed to succeed. The Academy attracts students from a wide range of backgrounds with the training designed to support not only those with coding or computer science experience, but young people interested in areas such as design and business. Academy classes are all based on Challenge Based Learning (CBL) which provides an efficient and effective framework for learning while solving real-world challenges. Today, 50+ countries are represented at the Academy; 1700+ developers have been trained; 800+ apps have been developed and 150+ scholarships have been provided.<sup>45</sup>

**3. Girls Code it Better:** The Italian initiative Girls Code it Better was born out of the commitment of the Officina Futuro Fondazione W-Group Foundation, with the aim of getting more girls to enter STEM careers. According to the Italian Education and Training Monitor report for 2020, boys in Italy are twice as likely as girls to expect to work in STEM fields.<sup>46</sup> To solve this gender disparity, Girls Code it Better focuses on girls in secondary education and aims to boost their interest in STEM-related topics and pathways. Girls Code it Better offers an afterschool course, which takes between 34 and 45 hours. Participants are trained by a teacher with tech knowledge, and a coach with technical skills. Participants are also free to pick a topic they would like to work on and bring it to life by designing a project in the following

areas: 3D design, modeling, and printing; web design and development; mobile application development, coding, and gaming; virtual and augmented reality and video creation. The initiative is completely free and open to everyone. Since the kick-off in 2014, the project has set up 390 clubs, reaching more than 7,500 girls, 156 schools, and 14 regions across the country.<sup>47</sup>

## CONCLUSION

The pervasive and ever-growing reliance on technology in the global economy has ushered in a transformative era, profoundly changing the world of work. With automation, AI, and digitization reshaping industries and redefining jobs, the thriving tech sector demands expanded opportunities for individuals to acquire the skills necessary for these high-demand careers.

Leaders across the U.K. and Europe are tirelessly working to ensure students, job seekers, and workers are prepared for these growing opportunities. Despite operating in different environments, these countries are all experiencing rapid growth in the tech sector, businesses that are desperate for skilled talent, and a scarcity of workers to fill open positions. This workforce shortage is

impacting their nation's economic growth and competitiveness. To address this, the U.K., France, Germany, and Italy have set national goals, implemented policies, and launched innovative programs to bridge the digital skill gaps.

While the examples highlighted in this report are promising beginnings, this phenomenon will require ongoing attention. To ensure widespread access to high-demand employment in the rapidly changing global economy, countries worldwide must follow suit. By developing policies, programs, and practices that address the digital skill divide, we can unlock the potential of individuals while providing businesses with the talent they need to remain competitive. This attention and action are crucial to ensure the benefits of the digital era are shared by all.

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## ABOUT THE AUTHOR

**Taylor Maag** is the Director of Workforce Development Policy at PPI. In this role, Taylor leads the New Skills for a New Economy Project, developing policy solutions that strengthen our nation's workforce, ensuring employers have the talent they need to remain competitive and people have the skills and critical supports necessary to succeed in today and tomorrow's economy.

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