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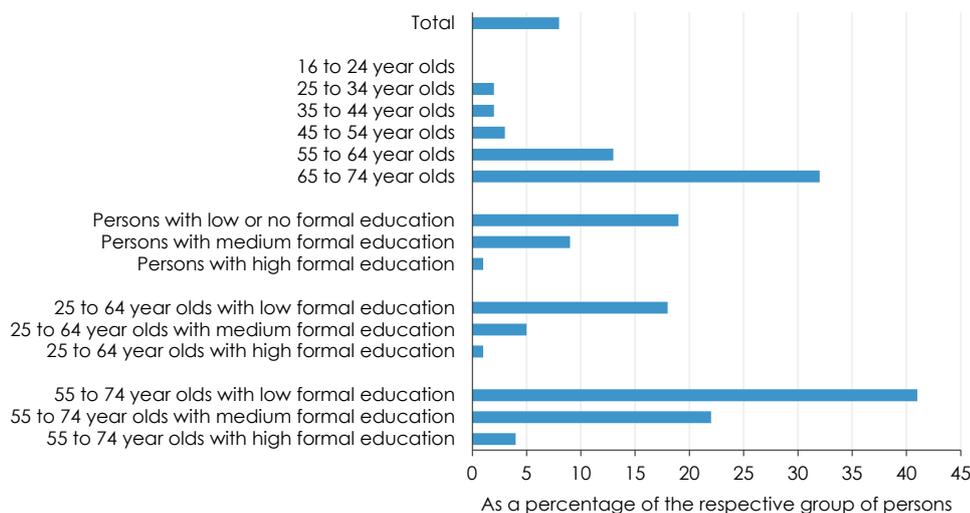
Digitalisation in Austria: Progress, Digital Skills and Infrastructure during COVID-19

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- Digital public services for citizens is one of Austria's strengths, while there is still scope for improving the offer of such services for businesses.
- The share of firms using cloud services has increased significantly in Austria since 2018, but is still far lower compared to the EU innovation leaders.
- Despite the comparatively low prices of fixed, mobile and converged broadband services, Austria is only in the middle field of EU countries in terms of private households actually using fast internet.
- In 2020, only 8 percent of the population in Austria never used the internet. These were very often older people, especially when formally low-skilled.

Proportion of people who never use the internet

Austria, 2020



"The COVID-19 pandemic highlighted that people without digital skills are at greater risk of social exclusion."

Among the people in Austria who never use the internet, older people are clearly overrepresented, especially those with low formal qualifications (source: Eurostat).

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Austria's performance in the digital transformation has been average by European standards. This is illustrated by a monitoring of selected indicators on the digital transformation of various areas of the economy and society. The growing importance of digital change has become quite evident in the current COVID-19 crisis: as digitalisation now affects all areas of life, basic digital skills and the use of digital infrastructure are no longer relevant for companies and the workforce only, but just as much for students and the rest of the population.

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1. Introduction

Even before the outbreak of the COVID-19 pandemic, the ongoing digitalisation presented far-reaching economic, ecological and social opportunities and risks. In the recent past, international comparisons have shown that Austria still needs to catch up in terms of digital skills by both population and companies (Kügler et al., 2020; Hölzl et al., 2019; European Commission, 2019a). The great importance of such skills and proper technological infrastructure suddenly became apparent in mid-March 2020 as a result of the health policy measures to curb the COVID-19 pandemic and affected almost all areas of life: digital skills and appropriate technological equipment were needed for home office work and distance learning, as well as for participation in online events or video calls to replace face-to-face meetings that had been eliminated due to contact and mobility constraints. In view of the weeks-long closure of stationary retail trade, many consumers switched to online shopping. This again required at least basic digital skills. Last but not least, electronic pre-registration was often required to attend COVID-19 tests or vaccinations. On the one hand, this digital penetration of all areas of life has opened up new

opportunities for innovation and participation, but on the other hand it has imposed major challenges for many companies and private households, threatening to exacerbate existing economic and social inequalities.

In Austria, almost the entire labour force needs at least basic ICT-skills, as CEDEFOP (2018), for example, has shown by the European Skills and Jobs Survey. However, this requirement is no longer limited to work force and companies. As the experience of the COVID-19 crisis also shows, it now applies to the whole population, regardless of age and education, and particularly to pupils, teachers and parents. In addition to such skills an appropriate technical and physical environment are a basic prerequisite for digital participation. This includes not only the broadband infrastructure, but also the appropriate technological equipment of public institutions, companies, schools and private households.

Against this backdrop, this paper reports on the status of the digital transformation process in Austria in an EU comparison and examines the extent to which public

institutions, businesses, the workforce, private households and schools were digitally provided at the outbreak of the COVID-19 pandemic in order to reduce the risk of digital

exclusion of certain segments of the population and prevent a loss of (international) competitiveness.

2. Digitalisation in Austria – an overview

In order to document the current state of digitalisation in Austria, a comparison was made – as in last year's WIFO-Monatsbericht (monthly report; Bock-Schappelwein et al., 2020) – on the one hand with the average of all EU countries and on the other hand with the average of the innovation leader countries in the EU. The selection of innovation leaders is based on the European Innovation Scoreboard (EIS) of the European Commission. In 2020, the group of innovation leaders consisted of Denmark, Finland, Luxembourg, the Netherlands and Sweden. The analysis on the status of the transformation process is based on five dimensions, each with three indicators: 1. the provision and use of digital public services, 2. the digital infrastructure, 3. digital transformation at company level, and 4. societal and 5. labour market-related aspects of digitalisation.

2.1 The provision and use of digital public services

In Austria, the range of digital public services is already good compared with other EU members. Austria has been performing very well for years in terms of the extent to which various steps in dealing with public administration can be handled completely online: measured by the index of digital public services for citizens (with values between 0 and 100), with a value of 88 Austria occupied a very good position in the EU in 2020 (5th place). Among the innovation leaders, only Luxembourg (90) and Sweden (88) showed higher results than Austria (Figure 1). The supply of digital public services for businesses in

Austria, however, was only slightly better than the EU average (84) with a score of 85 and clearly performed worse than innovation leaders such as Luxembourg (97) or Denmark (96). The actual demand for digital public services measures by the share of digital interactions with public agencies in Austria in 2020 (72) was lower than the average of the innovation leaders (83), but significantly higher than the EU average (56).

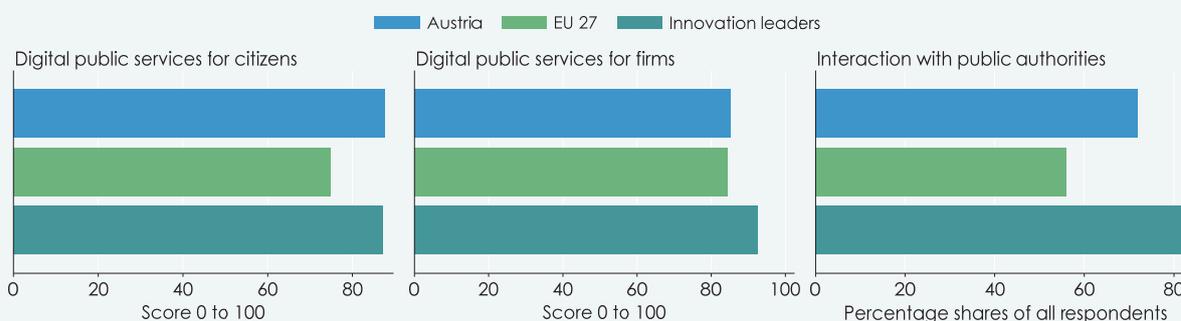
2.2 The digital infrastructure

The conditions for a comprehensive connection to fast internet are average to good in Austria. The prices of fixed-network and mobile services are significantly lower than the EU average. The Broadband Price Index ranks Austria as the 7th cheapest country in the EU in 2019. On average, broadband internet is also more expensive in the innovation leaders. However, Austria underperforms in terms of ultrafast broadband internet coverage: in 2019, it covered only 65 percent of households, i.e. 7 and 20 percentage points less than the EU average and the average of EU innovation leaders, respectively (Figure 2). In contrast, the roll-out of 5G mobile technology is comparatively advanced in Austria: in 2020, 33 percent of the total harmonised 5G radio frequencies had already been allocated, significantly more than in the EU innovation leader countries (24 percent, EU 20 percent). However, the gap to the top performing countries, Finland and Germany (67 percent each), shows that there is still potential for improvement.

Digital public services for citizens is one of Austria's strengths, while there is still scope for improving the offer of such services for businesses.

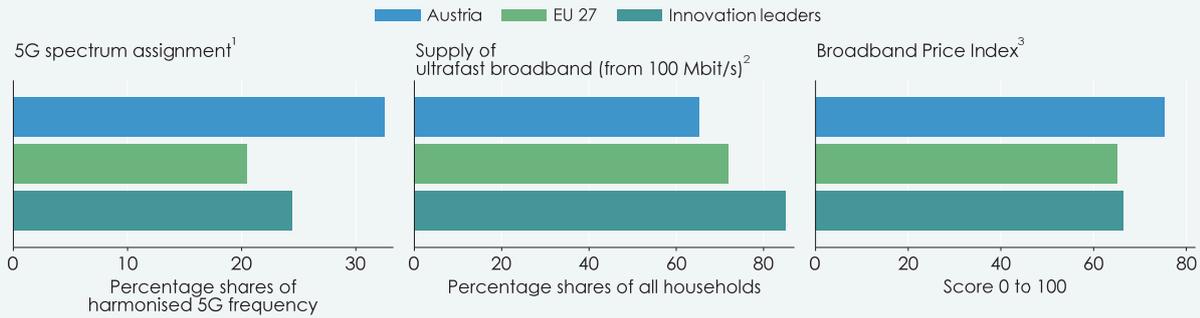
Figure 1: Provision and use of digital public services

2020



Source: WIFO calculations, DESI 2020, Eurostat.

Figure 2: Digital infrastructure



Source: WIFO calculations, DESI 2020, European Commission (2020b). – ¹ 2020. – ² 2019. – ³ 2019, higher index values imply a low price.

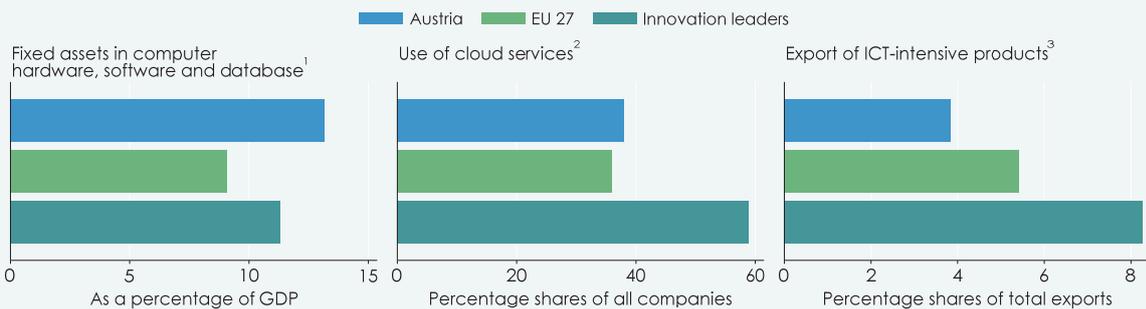
Austria has been able to increase the corporate use of cloud services significantly since 2018, but is still far behind the group of innovation leader countries.

2.3 The digital transformation at company level

The fixed assets in the industry class "computer hardware, software and database" already accounted for more than 13 percent of GDP in Austria in 2018, 4 percentage points more than the EU average (9 percent). The Austrian share of ICT fixed assets in GDP was also above the average of the innovation leader countries (11 percent). However, in terms of the adoption of new digital technologies Austrian companies continue to score only average. Although

the share of domestic companies¹ using cloud computing services rose significantly from 23 percent in 2018 to 38 percent in 2020, it was only slightly above the EU average (36 percent) and still well below the average of the innovation leader countries (59 percent). On the output side, with a share of ICT-intensive products in total exports of 3.8 percent (2019) Austria also ranked far behind the group of innovation leaders (8.3 percent). On average, the share of ICT-intensive products in total exports was 5.4 percent in the EU (Figure 3).

Figure 3: Digitalisation at company level



Source: WIFO calculations, Eurostat, BACI. – ¹ 2018. Values not available: Croatia and Sweden. – ² 2020. – ³ 2019.

Despite the comparatively low prices of fixed, mobile and converged broadband services, Austria is only in the middle field of EU countries in terms of private households actually using fast internet.

2.4 Social aspects of digitalisation

Compared to 2017, the digital competences of Austrian society remained largely unchanged². In 2019, around 66 percent of the population in Austria had at least basic digital skills (2017: 67 percent). The EU average was almost 10 percentage points lower, but the average of the innovation leaders was higher (73 percent). The application areas of digital skills are diverse. For example, 62 percent of the Austrian population used

their digital skills for online shopping. While this share was above the EU average (57 percent), it was again significantly lower than in the group of innovation leader countries (79 percent). In Austria, household demand for fast internet was significantly higher in 2019 than in the previous year, but still lower than the average of the innovation leaders: despite the comparatively low broadband prices in Austria, only 29 percent of households use a broadband connection with a download rate of more than

¹ This indicator is only available for the population of enterprises with more than nine employees.

² Individuals who have used the internet in the last 3 months are assigned a score in four digital skills

areas depending on the activities they were able to perform: information, communication, content creation and problem solving (source: Eurostat, Table isoc_sk_dskl_i: Individuals' level of digital skills).

100 Mbit/s (2018: 7 percent, EU 29 percent, innovation leaders 42 percent; Figure 4).

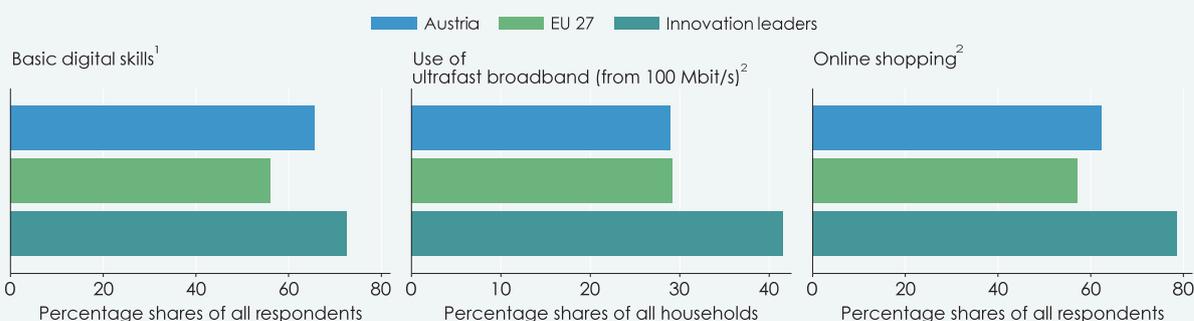
2.5 Labour market related aspects of digitalisation

With a share of graduates in STEM subjects (mathematics and statistics, computer science, natural sciences and engineering) of 31 percent of all graduates in the tertiary sector (2018), human capital in Austria basically has the key competencies to meet the challenges of the digital transformation. In the EU, this share was only higher in Germany (35 percent). On average, it stagnated at 25 percent in the EU and was also

significantly lower in the innovation leader countries at 22 percent. By contrast, the share of the 25 to 34 year old labour force with a tertiary degree is comparatively low in Austria at 43 percent (2020) (18th place in the EU). This value is just below the EU average (45 percent) and clearly below the average of the innovation leaders (53 percent). The share of ICT-specialists in total employment was 4.5 percent in Austria in 2020, slightly above the EU average of 4.3 percent, but clearly below the average of the innovation leader countries (6.6 percent, Figure 5). Within the EU, Finland and Sweden led the country ranking with shares of 7.6 and 7.5 percent respectively.

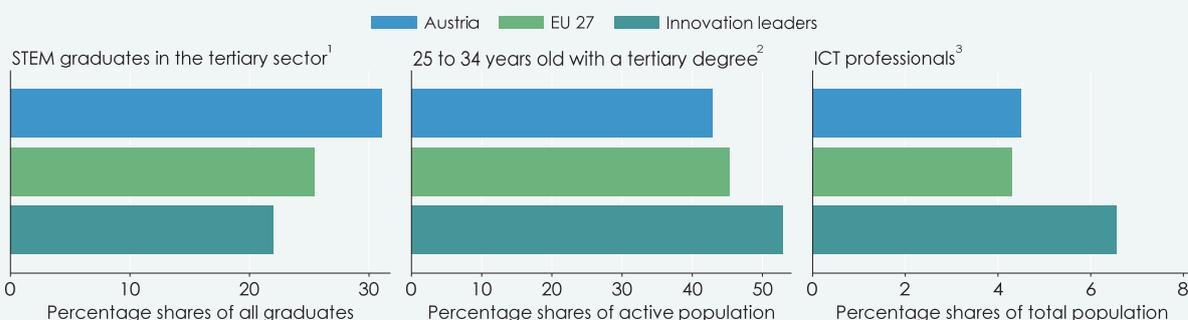
Despite the high share of STEM graduates, the share of ICT professionals in total employment in Austria is significantly lower than in the innovation leader countries.

Figure 4: Digitalisation and society



Source: WIFO calculations, DESI 2020. – ¹ 2019, individuals with at least "basic" digital skills in each of the following four dimensions: Information, communication, problem solving and use of content creation software (measured by the number of activities performed in the last 3 months; European Commission, 2020b). – ² 2019.

Figure 5: Digitalisation in the labour market



Source: WIFO calculations, Eurostat. – ¹ 2018. – ² 2020. Labour force: persons in active employment and unemployed. – ³ 2020. Total employment: all persons who worked for pay or profit for at least one hour during the reference week or were temporarily absent from such work.

3. Digital skills and infrastructure

The COVID-19 pandemic turned out to be an unpredictable driving force of digitalisation. In response to the infectious event, economic and public life was restricted to system-relevant areas within a few days in March 2020. Schools were suspended across the board, as was kindergarten care. Instead, there was a switch to distance

learning and care activities were provided for children whose parents worked in system-relevant sectors. Workers were expected to work in home offices wherever possible. Online retailing was expanded or adapted ("click-and-collect"). In the field of training, new online courses were set up and existing courses were expanded. At the same time,

there was increased use of electronic forms of payment, electronic registration (e.g. for COVID-19 tests or vaccinations) and tele-medicine.

with digital technologies. In Austria, too, parts of the population use the internet only very rarely or never, which may not only be due to a lack of digital skills, but also to insufficient technical equipment.

Older people, especially the low-skilled, are less likely to use the internet.

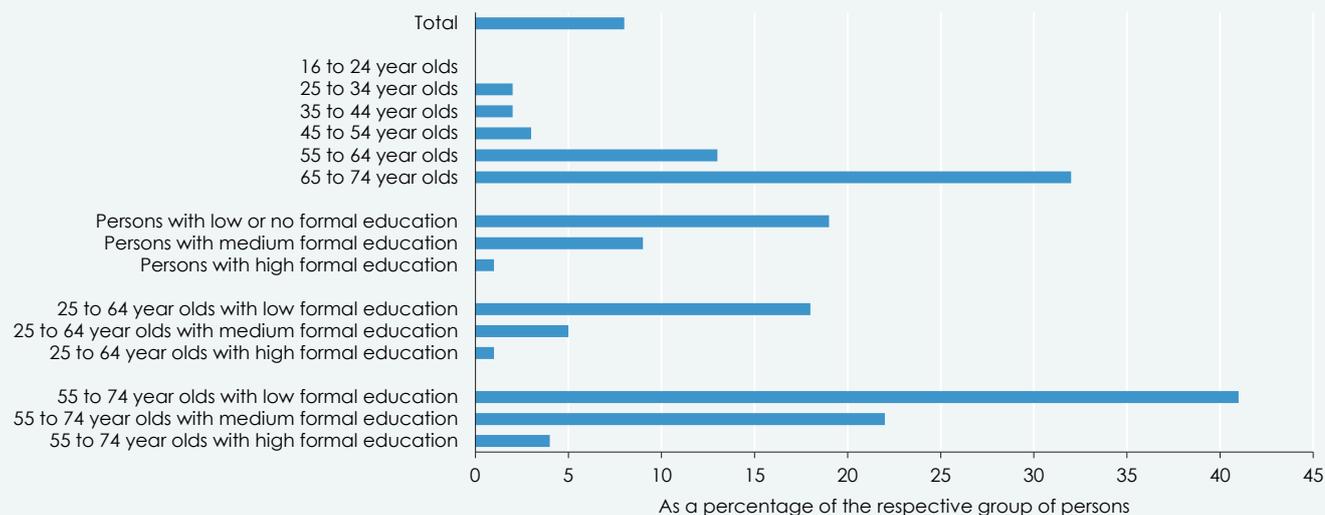
According to a survey by Mastercard, online offers gained in importance during the COVID-19 pandemic: in Austria, more than a quarter of the population used the lockdown in spring 2020 to engage with online banking, 24 percent came into contact with online educational offers, 22 percent with online cooking or baking tutorials. 21 percent used the internet to get information on health and medical care, another 18 percent to learn a foreign language³.

The use of such online offers requires, on the one hand, technical equipment including sufficiently fast internet access and, on the other hand, basic individual skills in dealing

According to Eurostat, the share of people in Austria who never use the internet was only 8 percent in 2020. However, there are noticeable differences by age and education: older people, and among them especially those with low qualifications, are clearly overrepresented (Figure 6). Among 65- to 74-year-olds, almost every third person never used the internet in 2020, among low-skilled 55- and 74-year-olds even almost every second (55- and 74-year-olds with intermediate education: 22 percent). In the age groups up to 54 years, this was true for 3 percent at most.

Figure 6: Proportion of people who never use the internet

Austria, 2020



Source: Eurostat.

With the outbreak of the COVID-19 pandemic, adequate technical infrastructure equipment in educational institutions and integrating digital competences in teaching suddenly gained in importance. According to the BMBWF's "8-Point Plan for Digital Education", all federal schools should have a broadband connection based on fibre optics and a high-performance and sufficient WLAN supply in the individual classrooms by 2023⁴. The expansion of broadband in compulsory schools is to be promoted via the "Broadband Austria Connect" programme, which supports the initial connection of

schools to the fibre-optic network. The maximum funding rate for compulsory schools is 90 percent, the maximum funding amount is 50,000 €⁵. According to Neumann et al. (2020), Broadband Austria Connect is endowed with a total of 28.8 million € (BMVIT, 2019, 31).

The 8-Point Plan of the BMBWF also provides for all pupils of lower secondary level (5th to 8th grade) to be equipped with a digital end device from the school year 2021-22⁶. The mandatory exercise "Digital Basic Education" has already been implemented in

³ <https://www.die-wirtschaft.at/die-wirtschaft/corona-measures-lead-to-boom-in-digital-pay-197680>.

⁴ <https://digitaleschule.gv.at/ausbau-der-schulischen-basis-it-infrastruktur/>.

⁵ <https://www.ffg.at/breitband/connect>.

⁶ <https://digitaleschule.gv.at/ziele/>.

the curriculum of lower secondary level since the school year 2018-19⁷.

The extent to which the education system was prepared for the COVID-19-related distance learning can be deduced from data on internet equipment in schools and the anchoring of digital education in the classroom. According to the current ICT infrastructure survey of the BMBWF (2020), both the WLAN coverage within schools and the proportion of schools with fast Internet connections (100 Mbit/s or more) have improved significantly in recent years; however, there are still noticeable differences between schools. Primary schools, like middle schools, are less likely than academic secondary schools and VET schools and colleges to have WLAN coverage or High-

speed Internet access (Table 1). In June 2020, only 2.4 percent of VET schools and colleges and 3.3 percent of academic secondary schools did not have WLAN, but 19.7 percent of primary schools, 14.0 percent of part-time vocational schools, 12 percent of special needs schools and pre-vocational schools and 7.7 percent of middle schools did. Although internet coverage in 2020 was better in all school types than in the survey year 2016 (BMB, 2016), in the case of primary schools and pre-vocational schools the catching-up process was much slower than in academic secondary schools and VET schools and colleges. The connection also progressed comparatively slowly in the middle schools and special needs schools.

Table 1: **Internet connection and download bandwidth by school type**

	No WLAN available		Download bandwidth from 100 Mbit/s	
	2016	2020	2016	2020
	Percentage of schools			
General secondary schools	12.7	3.3	13.1	49.8
Vocational secondary or higher schools	8.8	2.4	13.2	58.2
Primary schools	41.3	19.7	14.8	16.3
Secondary schools	19.5	7.7	17.2	28.2
Special schools	27.9	12.0	20.6	28.4
Polytechnic schools	25.1	11.7	16.8	22.2
Vocational schools	43.4	14.0	22.7	33.3

Source: Federal Ministry of Education (2016), Federal Ministry of Education, Science and Research (2020).

Academic secondary schools and VET schools and colleges also benefitted from the expansion of internet connections with a download speed of more than 100 Mbit/s to a disproportionately greater extent than primary schools and middle schools. In 2020, about half of the academic secondary schools and 58.2 percent of the VET schools and colleges in Austria already had an internet connection with a download speed of at least 100 Mbit/s, but only one third of the part-time vocational schools and only about one sixth of the primary schools (2016: 14.8 percent).

The availability of sufficiently dimensioned internet connections in public buildings and private households depends significantly on the condition of the general broadband infrastructure – and thus on the quality of the offer. Away from urban centres, broadband network coverage is still inadequate in some cases and an obstacle to the supply of

schools, businesses and private households. As the indicators on broadband infrastructure of the Digital Economy and Society Index show (European Commission, 2020a), there is a clear need to catch up in terms of network coverage in Austria, not only in the fixed high-performance range (VHCN), but also for bandwidths of 30 Mbit/s and above, which are the basic prerequisite for smooth streaming. In 2019, while 84 percent of domestic private households had access to such "basic" broadband coverage, about one in ten households was unserved. Only a small proportion of households had access to "Very High Capacity Networks" (VHCN). In addition to availability, the lack of demand from private households continues to inhibit the actual use of the existing infrastructure for work and education purposes: in Austria, only 29 percent of private households used fixed-network broadband connections of 100 Mbit/s or more in 2019.

4. Summary and conclusion

Austria continues to show mediocre performance in terms of progress in digital

transformation overall in European comparison (see also Bock-Schappelwein et al.,

⁷ <https://www.bmbwf.gv.at/Themen/schule/zrp/dibi/dqb.html>.

The COVID-19 pandemic revealed the risk of social exclusion of people who never use the internet.

For people without even basic digital skills, the risk of digital and social exclusion has increased.

Digital skills should be considered as a cross-cutting issue in education.

2020). In several aspects, a considerable gap remains to the European frontrunners, the "innovation leader countries" Sweden, Finland, Denmark, Luxembourg and the Netherlands. This is the case both in terms of the digital skills of the population and businesses and with respect to infrastructure, demand for broadband internet and the use of digital technologies in the public sector (Peneder et al., 2019; Bärenthaler-Sieber et al., 2018).

Digital skills – of companies as well as of the workforce and public administration – are increasingly important to maintaining international competitiveness, but many domestic companies fail to keep up with international competitors in the digital transformation process (Kügler et al., 2020). In the wake of the COVID-19 pandemic, basic digital skills suddenly gained substantial importance also among the general population. Such skills proved crucial for participation in economic, social and public (government) activities, which increasingly moved from physical into the digital space. During the COVID-19 pandemic, people without such digital skills were threatened not only with digital exclusion but also with social exclusion due to a lack of access to economic and social activities. These developments are likely to (also permanently) exacerbate existing economic and social inequality.

In addition to digital skills, the availability of an adequate broadband infrastructure is a basic prerequisite for frictionless access to the internet and the use of current technologies in companies, public institutions, private households and schools. However, a recent WIFO study (Friesenbichler et al., 2021) concludes that the goal of the Broadband

Strategy 2020 (BMVIT, 2014) to provide nearly all Austrian homes with fast broadband connections by the end of 2020, has not been achieved. This even though the so-called federal "Broadband Billion" has accelerated the expansion of the network infrastructure.

In evaluating the "Broadband Billion", Neumann et al. (2020) formulated a number of policy recommendations for the further implementation of the federal government's broadband strategy, including 1. redirection of subsidies in order to provide gigabit-capable connections across as much of the country as possible, 2. stronger focus on peripheral regions through regional adjustments to funding rates, 3. stronger orientation of subsidies towards actual (revealed) transmission rates instead of rates guaranteed by providers ex-ante, 4. the promotion of PPP financing models (such as the cooperation between nÖGIG and Allianz Capital Partners), 5. improvement of the data base for spatial coverage (coverage maps) with regard to the documentation of transmission rates (e.g. at least 30 Mbit/s, at least 100 Mbit/s) in order to facilitate effective monitoring and evaluation of the achievement of the economic policy goals.

At the school level, there are numerous initiatives to strengthen digital skills. On the one hand, they address the provision of infrastructure and, on the other hand, the anchoring of digital skills acquisition in the classroom. In line with its importance in the economy and society, the digital transformation must also be regarded as a cross-cutting issue in education. Accordingly, digital technologies and the teaching of corresponding skills should be given high priority in all subjects in all types of schools.

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