

»» Digital skills shortage is hampering German SMEs' digital transformation – is upskilling the answer?

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Author: Dr Arne Leifels, phone +49 69 7431-4861, arne.leifels@kfw.de

The digital transformation has reached all areas of the SME sector. But the digitalisation of enterprises is being hampered by a growing problem: lack of digital skills in the workforce.

Around 80% of SMEs have a great need for basic digital skills such as the ability to use standard software and digital devices. Just under one quarter (24%) of SMEs have a need for advanced digital skills such as programming and statistical data analysis skills. One third of SMEs cannot meet their digital skill requirements, as 34% experience a shortage of at least one digital skill.

There are three ways in which enterprises can acquire digital skills: through recruitment, outsourcing and further training. The latter has proven to be the most common strategy of SMEs. Training plays a role in building digital skills for 70% of SMEs and a major role for 31%. But short training measures with often limited skill-building effects predominate.

Barriers to training are mostly financial. Direct costs are a challenge for one third of SMEs, while absence from work is a problem for one quarter of them. This barrier is particularly high for small businesses with more limited human resources.

Digital learning formats (e-learning) have the potential to stimulate workplace-related training as they enable workers to learn at any time or place. Moreover, children and young people should already be given intuitive access to building complex digital skills such as programming, both within and outside the public education system.

Digitalisation in SMEs is gathering pace as 30% of small and medium-sized enterprises (SMEs) completed digitalisation projects in the years 2015–2017.¹ During the period of 2014–2016 it was just 26%. Digitalisation projects involve (more effective) use of digital technologies in processes and products and in companies' interaction with customers and suppliers but also the development of digital expertise. In 2017, SMEs spent EUR 15 billion on digitalisation projects. A similar amount (approx. EUR 13 billion) was spent on routine and replacement investments in IT.²

Digital skills shortage is a barrier

Enterprises believe a whole raft of hurdles need to be removed in order to speed up digitalisation. These include un-

resolved data protection and security issues. Another major hurdle to digitalisation that has gained even more importance is the shortage of human capital. In the Business Survey 2019 conducted by KfW, 38% of SMEs regard lack of IT skills in the existing workforce and lack of IT specialists in the labour market as an obstacle. Two years earlier, that figure was just 29%.³

An international study conducted by KfW Research with promotional banks from France, Poland, Spain and the United Kingdom shows that the situation is similar in other European countries.⁴ However, Germany has an above-average shortage of workers with digital skills. A special survey under the KfW SME Panel focused on these digital skills. It asked: What skills are important from the businesses' perspective, what skills are lacking? And what measures are SMEs adopting: are they hiring new skilled workers, or training their existing employees?

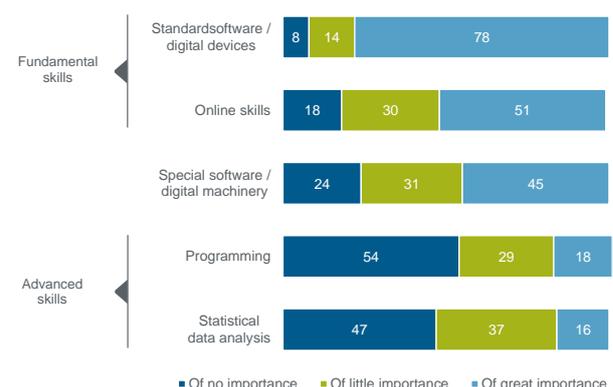
Basic digital skills are becoming the norm

The broad area of skills required in the digital age starts with basic skills such as the ability to use standard software (such as office) and devices (such as smartphones and tablets). They are now required in almost all businesses, as more than three quarters of SMEs attach great importance to these skills (78%), while only 8% consider them unimportant.

Online skills such as internet research skills, use of social media and online marketing are also necessary for the majority of SMEs, 51% of which consider them important for their business (Figure 1).

Figure 1: Basic skills are indispensable for SMEs

Importance of various digital skills for SMEs (shares in per cent)



Source: Special survey in the KfW SME Panel 2018

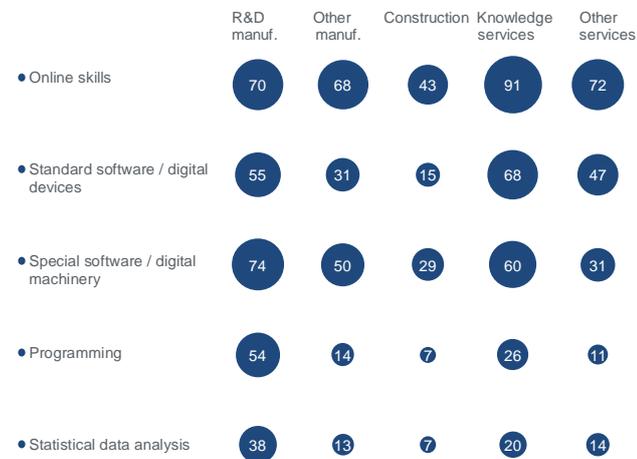
The ability to use specialised software or digital production equipment is by no means a rarely sought-after skill but important for 45% of SMEs. However, more specific and complex digital skills are required by a much lower percentage of SMEs. Programming skills are thus necessary for 18%, while more than half (54%) have no need for them at all. The same applies to complex statistical data analyses, which are of great importance for only 16% of SMEs.

Four in five SMEs have a great need for digital skills

A look at all the different skill areas reveals that four fifths of SMEs rely on digital skills. Seventy-nine per cent of SMEs have a great need for basic digital skills such as online skills, the ability to use standard software and digital devices, while 24% have a great need for advanced digital skills such as programming and statistical data analysis. Overall, at least one of the digital skills surveyed has great importance for 82% of SMEs, while only 18% of SMEs operate on a ‘fully analogue’ basis.

Figure 2: Programming and data analysis are important in knowledge-intensive sectors

Importance of various digital skills for SMEs by sector (Shares of ‘very important’ skills in per cent)



Source: Special survey in the KfW SME Panel 2018

Knowledge-intensive sectors have the highest need for all digital skills. This applies to both research- and development-intensive manufacturing and knowledge-intensive service providers (Figure 2). Some sectors stand out within these sectors. The high need of IT and financial service providers is obvious but engineering firms, the health sector and architecture firms also have an above-average need for digital skills.

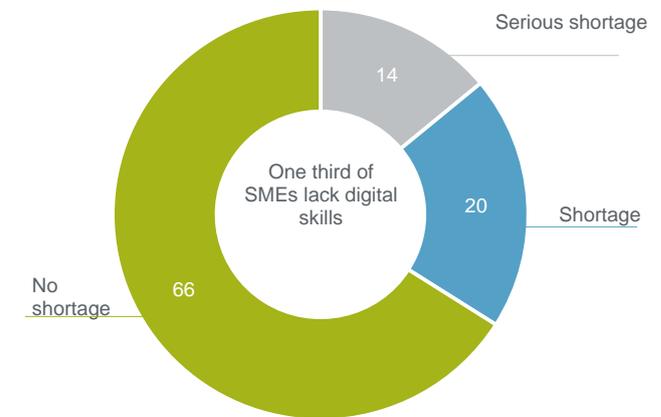
Research-intensive manufacturers need complex digital skills

The need for more complex digital skills is heavily concentrated in R&D-intensive manufacturing. Programming skills are important for 54% of SMEs in this sector and 38% require statistical data analyses. Even in knowledge-intensive services the corresponding shares are only half as high and programming and data analysis skills are much less important in other sectors.

Construction is a much less digital sector that attaches the least importance to all skills surveyed. Nearly half of construction firms, among them many small crafts businesses, are ‘analogue’, meaning they do not see a major need for any of the skills surveyed.

Figure 3: One third of SMEs lack digital skills

Based on the 82% of all SMEs that regard digital skills as ‘very important’ (in per cent)



Note: Significant shortage = need for at least one digital skill not/hardly met; shortage = need for at least one digital skill partly met.

Source: Special survey in the KfW SME Panel 2018

Unmet needs: one in three SMEs lack digital expertise

Given the accelerated structural transformation and ageing workforce⁵, there is reason to fear that the need for digital skills revealed by the survey is currently not being met in many enterprises. In fact, one in three small and medium-size enterprises report that their needs are not being met. One or more digital skills are lacking in 34% of SMEs. Significant constraints were reported by a notable 14%, meaning that the need for at least one digital skill is not being even partly met (Figure 3).

An analysis of the individual digital skills reveals a similar picture: Approx. 70–80% of SMEs with these needs are able to meet them, while 20–30% of SMEs have shortages. These include some 5–10% with serious shortages. They apply to online skills, standard and specialised software and the use of digital devices and machines – as well as to programming skills (Figure 4).

There is one departure from this pattern: Complex statistical data analysis skills appear to be scarcer. Only 55% of SMEs that need such digital skills meet their requirements. Here as well, only 5% have a serious shortage but it is very common for data analysis skills to be met only in part (40%).

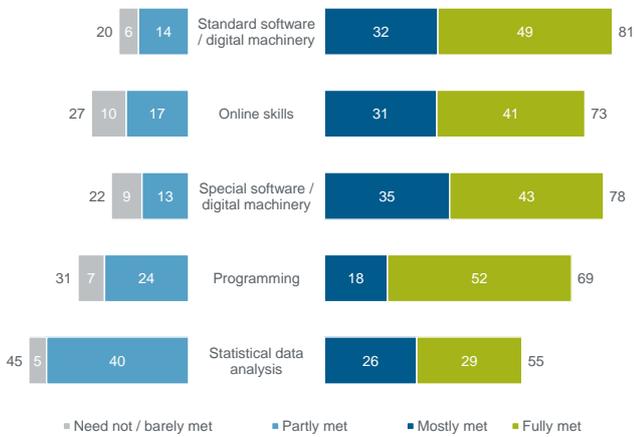
Research-based industry has the most serious shortages

The analysis by economic sector reveals a peculiarity: The degree to which digital skills requirements are met in R&D-intensive manufacturing – a sector with particularly high needs – is generally below average. Overall, at least one digital skill is lacking in one in two enterprises in this sector. For

example, the need for online skills is met in only 40% here – compared with 73% on average across all sectors. Specialised software (60 vs. 78%), programming skills (51 vs. 69%) and data analysis skills (35 vs. 55%) also exhibit below-average representation.

Figure 4: Data analysts desperately wanted

Degree to which various digital skills are met (shares in per cent) Refers to SMEs that attach 'great importance' to the relevant skill.



Source: Special survey in the KfW SME Panel 2018

The answer: hire new staff or upskill workforce?

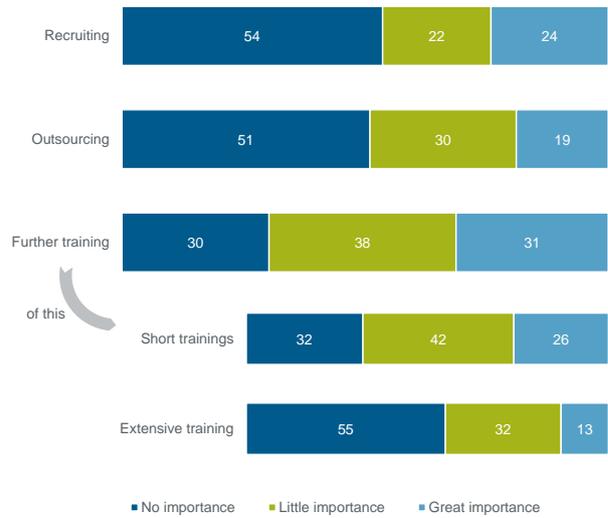
When businesses require expertise, there are fundamentally three ways to obtain it: 1) hire new skilled workers, 2) upskill existing workers or 3) outsource tasks. To acquire digital skills, clearly more SMEs prefer upskilling their workforce to hiring new workers or outsourcing. Workforce training plays a role for 70% of SMEs that require digital skills, and a major role for 31%. Significantly fewer SMEs prefer to hire new staff. Recruiting new skilled workers who possess the required digital skills plays a role for just under half of SMEs (46%) and it plays a major role for 24% of these. Outsourcing particular tasks also plays a certain role for half of enterprises but less often a major role (19%, Figure 5).

Training measures tend to be of short duration

Training is the key strategy adopted by German SMEs to acquire digital skills. This is also illustrated by the international comparison made in the European SME Survey.⁶ On closer inspection, however, it is clear that enterprises tend to rely on short training measures. Intensive retraining or study courses play a major role for only half as many SMEs (13%) as short-term training (26%). This is a general phenomenon across all training measures, as a previous study by KfW Research has shown. A large portion of the 16 million workers participating in training each year attend only short events, invest only a few hours in further training and receive only certificates of attendance at the end instead of generally recognised certificates of attainment. The actual training outcome is therefore often low.⁷

Figure 5: Upskilling to tackle digital shortages

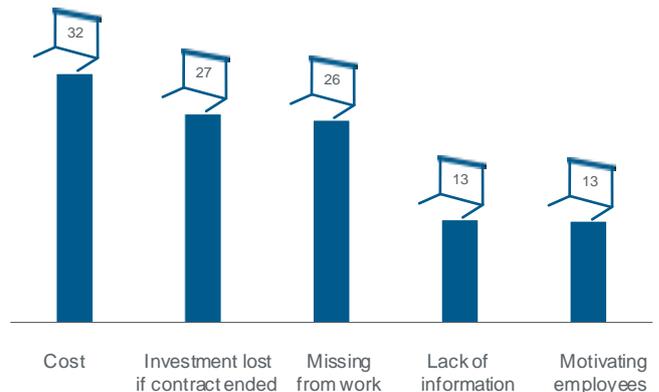
Importance of measures aimed at acquiring digital skills (multiple answers were possible, shares in per cent). Refers to SMEs that attach 'great importance' to at least one digital skill.



Source: Special survey in the KfW SME Panel 2018

Figure 6: Cost is the highest barrier to training

Frequency of different barriers to training (multiple answers were possible). Refers to SMEs that attach 'great importance' to at least one digital skill.



Source: Special survey in the KfW SME Panel 2018

Barriers to continuing education: costs and absence from work

Why are enterprises not providing more frequent and more intensive training to acquire the necessary digital skills? Lack of employee interest in training is hardly the issue, with only 13% of SMEs referring to this as a major hurdle. The same low percentage of SMEs reported lack of information about training opportunities as a major problem (Figure 6).

The main hurdle is cost. One third of SMEs (32%) responded that cost is a barrier to further training. Another structural problem which employers face in investing in human capital is that the acquired skills do not belong to the employer but to the employees. If their employment ends, these skills are then lost to the business. This makes a good one quarter of SMEs (27%) less willing to invest in workers' skills. Another quarter (26%) also indicated that employees' absence from

work was a problem, particularly when order books were full and skilled labour was in short supply.

E-learning is an opportunity – especially for small businesses

For small businesses, financial hurdles are even slightly higher than average. This applies in particular to employees' absence from work during training. Because they have fewer employees, small businesses have less flexibility to replace absences with substitutes. This problem is not just a barrier to training paid by employers but also prevents them from giving employees leave to pursue self-funded training activities.⁸

Digital learning has the potential to greatly increase training activity in Germany. The fundamental advantage of digital learning formats such as learning videos, (adaptive) apps, online seminars, massive open online courses (MOOC) etc. is that they allow workers to learn at a time and place of their choosing. That fits in very well with the flexibility requirements and resource constraints of small enterprises. But the enormous flexibility of e-learning also has a downside. It demands high self-motivation and self-organisation, as well as basic media competence. At the same time, the technical and educational quality of digital training offerings has improved in recent years.

Digital education should start early ...

More complex digital skills such as programming skills can often be acquired only in intensive, time-consuming training courses. This is often a problem despite the greater flexibility (and at best, greater efficiency) of digital learning formats. This should start as early as possible, in other words, in the

school classroom and during the vocational training stage. In recent times, increasingly more labour market-relevant digital skills were mainstreamed into the training regulations of many teaching professions, ranging from IT security through networked production to programming (e.g. for mechatronic technicians). School curricula are being adapted at very different rates and often slowly. Data protection issues and responsible use of social media are priority themes in schools – and rightly so. As part of the 'Digital Pact for Schools', EUR 5 billion is being invested in the digital infrastructure of Germany's schools but for the time being students will be acquiring digital skills primarily at home and in their free time and school will not be the primary space for learning digital skills.

... including outside school

In addition, children and young people should be offered the most diverse learning opportunities possible outside the school system. Supplementary educational opportunities in the afternoons or during holidays can provide crucial impetus for learning digital skills intuitively. The number of digital workshops, hacker schools and coding camps is growing steadily. These have long ceased to be just small, volunteer projects. A current example (financed by KfW) of a large-scale project is TUMO, a digital media learning centre where young people in Berlin will be able to learn programming, design and robotics skills at no cost in the near future. From the viewpoint of educational economics, in all these offerings the key aspect is cost. There is a need to avoid exacerbating the basic problem of education – that educational opportunities are not equal – by waiving fees, applying social criteria or awarding scholarships.⁹

¹ Zimmermann, V. (2019), **KfW SME Digitalisation Report 2018**, KfW Research.

² Leifels, A. (2019), **Mittelstand rechnet mit steigenden Digitalisierungskosten** (*SMEs expect rising digitalisation costs* – in German only), Economics in Brief No. 188, KfW Research.

³ Zimmermann, V. (2019), **Business Survey 2019 – Digitalisation**, KfW Research.

⁴ KfW, Bpifrance, BGK, ICO, BBB (2019), **European SME Survey 2019 – Going Digital – The Challenges Facing European SMEs**.

⁵ Gerstenberger, J. (2017), **Produktivitätsschwäche von KMU: der demografische Wandel kann sie nicht erklären** (*Productivity weakness of SMEs: demographic change is no explanation* – in German only), Focus on Economics No. 171, KfW Research;

Zimmermann, V. (2016): **SMEs and innovation - enterprises innovate less as their workforce ages**, Focus on Economics No. 125, KfW Research;

Leifels, A. (2016), **Older workers in SMEs - a golden asset, or a liability?**, Focus on Economics No. 122, KfW Research.

⁶ KfW, Bpifrance, BGK, ICO, BBB (2019), **European SME Survey 2019**.

⁷ Leifels, A. (2017), **Participation in continuing education is unequal – especially by prior attainment**, Focus on Economics No. 153, KfW Research.

⁸ In such cases, financial support for employees of small businesses is not a solution either (pursuant to section 82 of the German Social Code III).

⁹ Cf. Leifels, A. (2016): **Bildungshürden und Studienfinanzierung in Deutschland** (*Educational obstacles and student finance in Germany* – our title translation, in German only), Focus on Economics No. 144, KfW Research.

Leifels, A. (2019), **Evaluation: KfW-Studienkredit ermöglicht Bildungsinvestition, Absolventen erfolgreich am Arbeitsmarkt** (*Evaluation: KfW student loan enables investment in education, graduates succeed in the labour market* – in German only), Focus on Economics No. 256, KfW Research.