

German SMEs lack digital skills, need more training

No. 346, 16 September 2021

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

Digitalisation is an integral part of SMEs' day-to-day operations. Having a workforce with basic digital skills such as knowing how to use computers, tablets and standard software is of great importance for more than 80% of small and medium-sized enterprises (SMEs). In addition, one quarter of SMEs have a need for advanced digital skills such as programming and statistical data analysis.

Nevertheless, many SMEs are beset by a digital skills shortage. A supplementary survey conducted as part of the KfW SME Panel has revealed that one third of enterprises that have a great need for digital skills are unable to meet this need. Businesses hit by the coronavirus crisis are more likely to experience gaps and deficiencies than those that have remained unaffected (37 vs. 26%)

It is not least as a result of the coronavirus crisis and the slump in training activity that SMEs' efforts to improve their workers' digital skills have stalled. The need and the shortage of digital skills were already on a very similar level in 2018. To be sure, companies are now a bit more successful in meeting their need for basic digital skills, but the shortage of advanced skills has actually worsened.

Businesses have recently experienced a significant increase in the need for further digital training, and that need is now greater than in all other areas. But the costs and shortage of suitable training opportunities act as barriers for many SMEs.

Expanding in-house and individual training activities would provide even short-term improvements in productivity and competitiveness. Financial support and continuous improvements to digital learning formats could create significant educational incentives. In the long term, attaching greater importance to digital education in schools and child daycare centres will also be key.

Digitalisation, the diffusion of information technologies across the economy, is an important driver of technological progress and, thus, productivity and economic growth. For businesses, digitalisation activities aimed at improving (or introducing) the use of digital technologies in processes and products and in their interaction with customers and suppliers is a great opportunity for strengthening their own competitiveness. Enterprises feel growing pressure from customers, competitors or business partners to go digital.¹

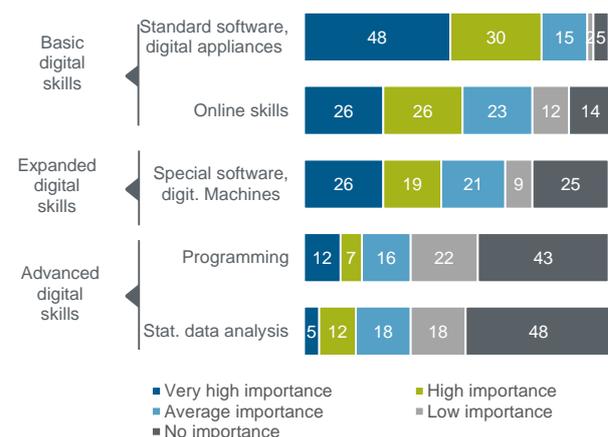
Investment in the future requires digital skills

At first glance, the coronavirus crisis gave digitalisation a boost. During the crisis, 27% of SMEs expanded their digitalisation activities but only 15% reduced them.² However, it can be assumed that in many cases these were short-term measures adopted to enable remote working, videoconferencing or online sales, for example. More in-depth long-term digitalisation projects, on the other hand, are likely to be deferred in times of crisis. Overall, the crisis has dampened and continues to dampen businesses' forward-looking investment, so it is all the more important to expand it coming out of the crisis.

A key factor in digitalising business processes is human capital. Structural changes in technology are making digital skills in the workforce increasingly important. For years, businesses have mentioned a lack of IT skills as one of the most frequent barriers to digitalisation.³ Building digital capacity through recruitment or further training is at the core of 38% of SMEs' digitalisation projects.⁴

Figure 1: Basic digital skills are indispensable

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



Source: KfW SME Panel, 5th supplementary coronavirus survey, May 2021.

Basic digital skills are needed almost everywhere

The broad range of skills required for the digital age includes, first of all, basic skills such as the ability to use standard software (for example office suites) and devices (such as smartphones and tablets). They are now required in most companies, as more than three quarters of SMEs (78%) regard them as being important (30%) or very important (48%) (Figure 1). Only 5% of businesses do not need them. Basic online skills such as knowing how to research on the internet and interact on social media platforms are important for half (52%) of SMEs. In total, 80% of all SMEs have a high

or very high need for at least one of these basic digital skills, while 50% need both.

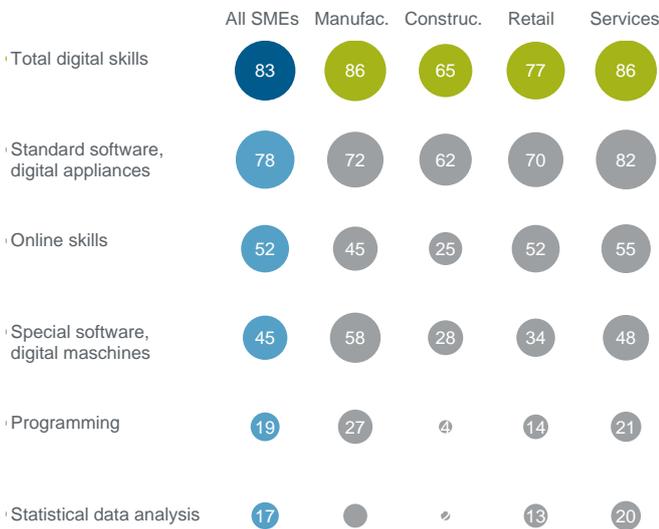
The ability to operate software or digital production machines as an expanded digital skill is of high or very high importance for half of SMEs (45%). A lower percentage of SMEs requires more specific, advanced digital skills. Thus, programming skills are (very) important for 19%, while 43% have no need for them at all. The same applies to complex statistical data analyses, which are of (high) importance for 17% but irrelevant for 48% of SMEs. But that does not mean they should be regarded as exotic qualifications. After all, one quarter of SMEs (26%) have high requirements in at least one of these advanced skills areas – that is almost 1 million companies.

In short: Four in five SMEs have a great need for digital skills

A look at all the different skills areas reveals that only a small portion of the SME sector continues to be ‘completely analogue’. Overall, at least one of the digital skills surveyed has great importance for 83% of SMEs. But this share varies from one economic sector to another. It is below average in the construction sector and in retail and wholesale (65 and 77%) but above average in manufacturing and services, at 86% each.

Figure 2: Services and manufacturing have the highest need

Importance of different digital skills for SMEs by sector (percentage of skills with ‘high/very high importance’)



Source: KfW SME Panel, 5th supplementary coronavirus survey, January 2021.

A closer look at the individual digital skills also shows that the needs in the services sector are consistently above the average (Figure 2). In manufacturing, a high need for basic digital skills is slightly less common, but the need for programming skills is highest by far (27%), as is the ability to operate specialist software and digital machines (58%). In the construction sector, which includes many small crafts businesses, the majority of firms (62%) only require their workers to be able to operate standard software/devices. Online skills play a subordinate role (25%), while

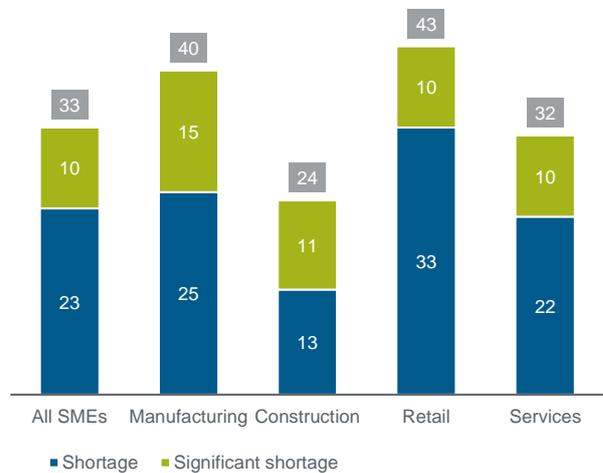
programming and data analysis are a rare exception (4 and 2%).

One third of SMEs have unmet digital skills needs

Digital skills are now a standard requirement in most businesses. But given the pace of the digital structural transformation, ageing workforces and the crisis-induced slump in continuing workplace education, there is reason to fear that SMEs have difficulty meeting the identified need for digital skills. Indeed, skills shortfalls affect one third of businesses, meaning at least one digital skill that is important for them is lacking. Ten per cent of them even have substantial gaps, meaning their needs are not even partly met (Figure 3).

Figure 3: Greatest shortfalls in retail, wholesale and manufacturing

SMEs with digital skills shortages as percentage of the 83% of SMEs that attach ‘high/very high importance’ to at least one digital skill



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

Source: KfW SME Panel, 5th supplementary coronavirus survey, May 2021.

The deficiencies differ across economic sectors. Retailers and wholesalers are most affected, at 43%. At 40%, they are also above average in the manufacturing sector. Furthermore, substantial deficits are widespread here (15 vs. 10–11% in the other sectors). In the construction sector, the relatively few SMEs that have a (very) high need for digital skills appear to be able to meet their requirements relatively well, with only 24% reporting bottlenecks.

Severe shortages of programmers and data analysts

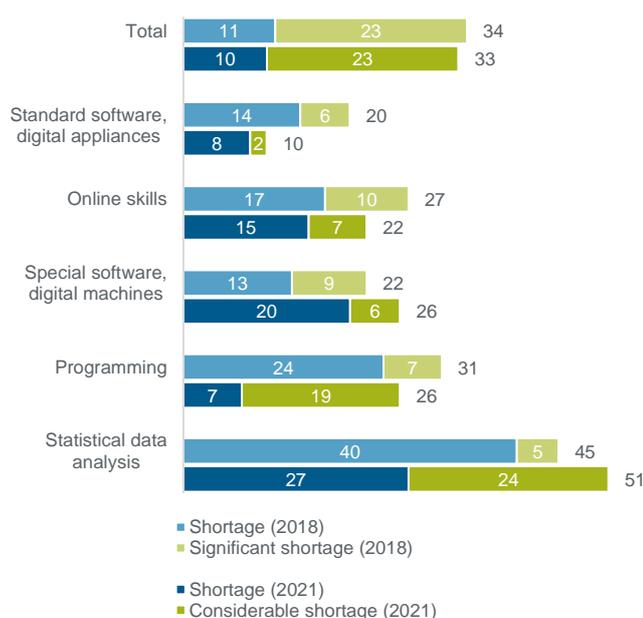
The lower deficits in the construction sector are also due to the fact that the needs here are often limited to the ability to operate standard software and digital devices. The analysis of deficits in the individual skills areas shows that basic skills generally pose the fewest problems. SMEs with a high or very high need are unable to meet their need in only 10% of cases (Figure 4). A lack of basic online skills is more common and 22% of SMEs have deficits.

One quarter (26%) of SMEs with a (very) high need for programming skills and skills in operating specialised software have deficits. The programming skills situation is

more problematic, however, as considerable deficits are remarkably frequent here, at 19%. The shortage of statistical data analysts is even more severe. Half the SMEs (51%) with a high or very high need (17% of all SMEs) are unable to meet their requirements. Here, too, substantial deficits are a very high 24% – that is, these companies cannot meet their needs even in part.

Figure 4: Data science – the problem child

SMEs with specific digital skills shortfalls as a percentage of SMEs that attach 'high/very high importance' to the relevant skill (years 2018 and 2021)



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

Source: KfW SME Panel, 5th supplementary coronavirus survey, May 2021.

Comparison with 2018: SMEs have made no progress in building digital skills

KfW Research examined the digital skills needs and gaps as part of the KfW SME Panel already in autumn of 2018.⁵ The key indicators have hardly changed since then. The level of needs is virtually the same: in 2018, 82% of SMEs had a high or very high need for at least one of the skills surveyed. In 2021 that figure is 83%. The shares of the individual components are also very similar.

As for the extent to which needs are being met, not much has changed since 2018. Then as now, one third have been experiencing a digital skills deficit and in 10% that deficit is substantial (Figure 4). A closer comparison, however, shows different trends for the individual skills areas. Companies are now slightly better at meeting their need for basic digital skills. The shortage of skills needed to operate standard software/devices has dropped by half (10 vs. 20%) and shortages of online skills have become much less common (22 vs. 27%).

Shortage of advanced skills is growing

By contrast, the shortages of complex digital skills have rather intensified. The share of SMEs with unmet needs for advanced skills required to operate specialised software or digital production machines has grown moderately from 22 to 26%. The shortage of data analysts, who are scarce to begin with, has also increased from 45 to 51% of SMEs. Shortages of programming skills have decreased slightly (down from 31 to 26%).

What is worrying, however, is not so much these rather minor shifts but the sharp rise in significant shortages of advanced digital skills. Thus, the share of enterprises that cannot even partly meet their needs for programming skills has grown dramatically from 7% in 2018 to 19%. Substantial shortages of statistical data analysts have also become much more widespread, jumping from 5 to 24%. This development is a sign that a gap between skills levels is beginning to open up. A lack of advanced digital skills might increasingly act as a bottleneck.

Coronavirus crisis has increased the need for (basic) digital skills

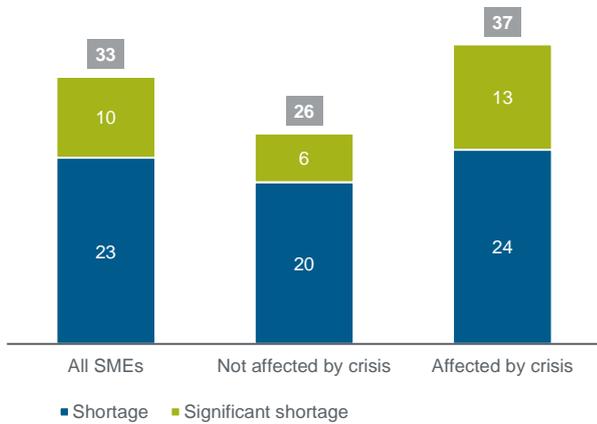
KfW Research has demonstrated that the coronavirus crisis has had a profound impact on digitalisation and businesses' human capital formation.⁶ To what extent could the crisis have caused the development of digital skills needs and shortages described above? A comparison between the companies that have and have not been affected by the crisis provides indications. In general, the two thirds of SMEs that have been affected by the coronavirus crisis – through turnover losses, liquidity bottlenecks or staff outages – are slightly more likely to have a high need for digital skills (85 vs. 80% of unaffected SMEs). Their need for basic digital skills in particular is higher (81 vs. 74% for standard software and 56 vs. 46% for online skills). This is consistent with the view that simpler digitalisation projects have priority in times of crisis.

SMEs affected by the coronavirus crisis lack digital skills more often

The main difference, however, is how they meet their needs. SMEs affected by the crisis are much more likely to be grappling with digital skills shortfalls, with 37% being unable to meet their needs. That share is 26% among unaffected SMEs, well below the average of 33% and below the 2018 level of 34%. Significant deficits in particular are more frequent, appearing roughly twice as often in SMEs affected by the crisis, at 13 vs. 6%. Coronavirus-affected businesses are also less successful at meeting their needs for all individual digital skills.

Figure 5: Crisis-affected SMEs experience greater shortages

SMEs with digital skills shortages as percentage of SMEs that attach 'high/very high importance' to at least one digital skill



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

Source: KfW SME Panel, 5th supplementary coronavirus survey, May 2021.

The causal relationship between crisis impact and digital skills is difficult to assess, since sectoral/size effects and the economic state of the individual businesses obviously play a role as well. However, the available data do permit three conclusions to be drawn: First, the coronavirus crisis increased the need for basic digital skills – at least in the short term.

Coronavirus crisis hampered the development of digital skills

Second, the crisis made it more difficult to meet the need for digital skills. This also means that in a hypothetical situation without the coronavirus crisis, the gaps would presumably have narrowed since the first survey of the year 2018. The crisis is partly responsible for SMEs' inability to make progress in building digital skills.

Third, the growing shortages of advanced digital skills do not appear to be directly related to the coronavirus crisis. The widening gap between skill levels is more likely to be a structural problem.

Gap between training needs and training activity

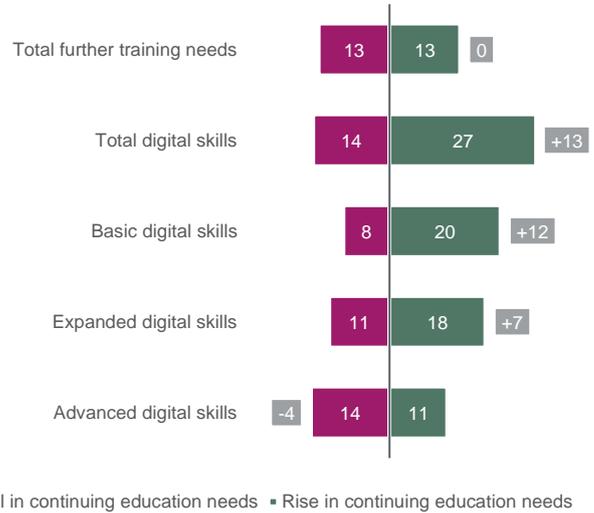
Businesses build skills by hiring specialists who have the necessary qualifications or by upskilling existing workers. As KfW Research has recently shown, SMEs' need for further training remained largely steady in the crisis year 2020 (Figure 6).⁷ It rose significantly in the field of digital skills alone, where 27% of SMEs have a greater need for further training and 14% have a lower need than the year before.

In line with the results stated above, training in basic digital skills has taken centre stage during the crisis (20% with a higher vs. 8% with a lower need for further training). The overall need for further training in advanced digital skills has dropped slightly. Although the shortages of more complex digital skills have tended to grow in the past years, the crisis appears to have prevented broad digitalisation projects of

SMEs – and thus the identification of specific further training requirements.

Figure 6: Need for further digital skills training is rising

Variation of SMEs' further training needs in 2020 (in per cent of SMEs).



Source: KfW SME Panel, 4th supplementary coronavirus survey, January 2021.

Barriers to continuing education: costs and inadequate training offer

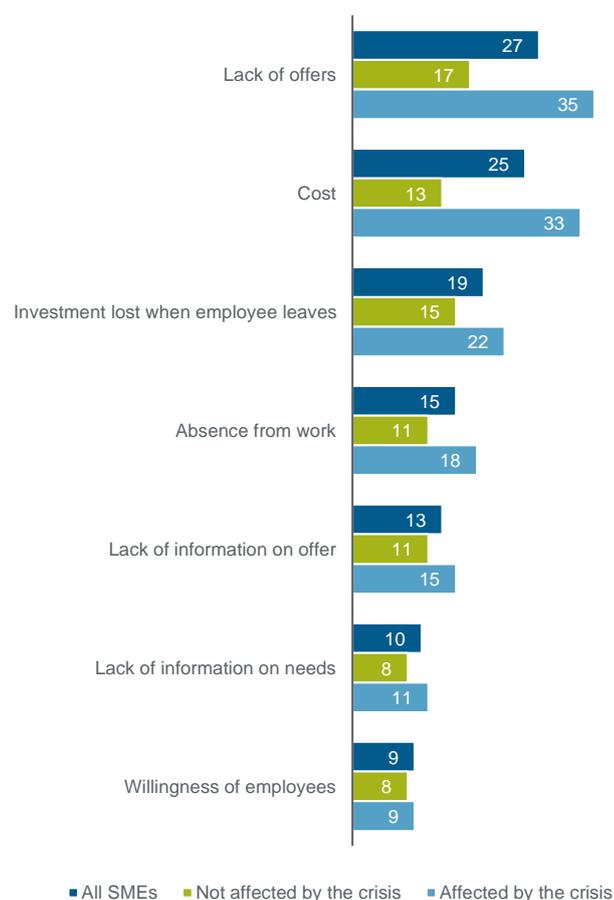
In-house continuing education has a strong tradition in Germany, but the crisis has literally stopped it in its tracks. As KfW Research demonstrated in the spring, 38% of SMEs scaled back their training activities in 2020, and half of them cancelled them altogether.⁸ There is a wide gap between training needs and training activity.

According to the most recent supplementary survey under the KfW SME Panel, there are two main reasons for this. First, businesses perceive a lack of offers for suitable digital skills training; 27% of SMEs with a high need for digital skills see this as a problem (Figure 7, multiple answers were possible). Not only do they have reservations regarding content or teaching methods, they have also cancelled face-to-face events in response to the crisis. The second major barrier to continuing education is cost, which is a crucial problem for one fourth of SMEs. These barriers are a much greater problem for coronavirus-impacted businesses than for those that were not affected (33 vs. 13%) because acute losses in turnover and liquidity gaps necessarily reduce businesses' training budgets.

Another structural problem which employers face when investing in human capital is that they lose the acquired skills when their employees leave the company. This makes one fifth of SMEs (19%) less willing to invest in workers' skills. Employees' absence from work during training is a problem for 15% of employers. Sometimes, information deficits also prevent further training, as 13% of firms are not sufficiently informed about available training opportunities and 10% do not know their specific training needs. An unwillingness on the part of workers to undertake further training is not really a major problem (9%).

Figure 7: Insufficient suitable training opportunities

Frequency of various barriers to training (shares in per cent, multiple answers were possible), refers to SMEs that attach 'high/very high importance' to at least one digital skill.



Source: KfW SME Panel, 5th supplementary coronavirus survey, May 2021.

A further education campaign is urgently needed

The economy is in the throes of the digital structural transformation, which makes the crisis-induced decline in continuing education so problematic. A shortage of skills in the workforce is one of the biggest barriers to digitalisation. More than 80% of SMEs have a high or very high need for digital skills. One third of these enterprises cannot fully meet their need, one tenth not even in part. That was already the case in 2018, which means that SMEs have made no progress. This deficit cannot be eliminated unless further training activities are expanded significantly.

In-house further training has been and remains the broadest basis of continuing education in Germany, not least because companies can best identify their specific needs on the ground. Companies that were more heavily affected by the crisis need particular support. Among other things, they require information and advice, particularly in connection with new and changing thematic areas such as digital skills. Most of all, they need effective training incentives in the form of financial support. Besides promotional loans and direct cost reimbursement, such support could include tax benefits for continuing education expenditure that treats investment in human capital the same as investment in assets and permits costs to be depreciated.

Strengthen personal initiative, promote individual continuing education

In the in-house training segment, however, brief, targeted training events with limited impact on human capital are most common. This also perpetuates educational differentials because the higher a person's level of education, the more opportunities they have for further training. Unemployed persons have the greatest need for further training but are left out. For this reason and given the increasingly diverse career and occupational biographies, it is important to strengthen the role of individual continuing education. The guiding principle is self-directed proactive lifelong learning – but not in isolation. Workers need support both in the form of finance and in the certification of qualifications and in the navigation and quality assurance of the confusing and semi-professional continuing education market.

This can strengthen personal incentives to plan continuing education for the long term and beyond the needs of the current employer and, where useful, to undertake broad continuing education or retraining. In many thematic areas the potential effect on productivity and competitiveness is so strong that broad support is in the interest of society – and this includes acquiring necessary digital skills. From an economic point of view, a cross-ministerial joint effort of further education policy would be a worthwhile project of the 20th legislative period that begins in autumn.

In this context, digitalising learning has the potential to greatly increase further training activity in Germany. A fundamental advantage of digital learning formats such as online seminars, learning videos, adaptive learning apps and other approaches is that they allow workers to learn at a time and place of their choosing. This is relevant not just in times of pandemic but also in structurally weak regions with limited further training opportunities. However, online formats require technical equipment as well as a certain level of prior digital knowledge and self-motivation. The coronavirus-induced digitalisation surge is likely to have lowered technological barriers and other reservations many people have had.

Formal education in the digital transformation

Obviously, digital skills teaching must already be appropriately included in the formal education system. Labour market-relevant digital skills, from IT security through networked production to programming, are being increasingly mainstreamed into the training regulations of many teaching professions. Cross-occupational standard content relating to the digital working world is gaining importance as well.

The use of digital teaching and learning methods at universities is growing, and the coronavirus crisis has provided strong impetus that has revealed potentials and weaknesses. However, when they complete their degree course, only around half the students have digital skills that meet the needs of the digitalised working world.⁹ Many university entrants lack even the basic skills they should already have when they begin their studies. One third of eighth grade students in Germany have only rudimentary computer and

media skills.¹⁰ The social class differentials in educational preparedness are particularly large in this field because these skills are acquired not so much within the educational system but in the family.

Digital education begins in child daycare centres and schools

To ensure more equitable educational and participatory opportunities, digital education should start early in the formal education system. Basic algorithmic thinking and the use of tablets can be playfully practised already at child daycare centres. The progressive expansion of primary schools to full day is opening up spaces for new educational themes and formats. Digital expertise can be brought into afternoon lessons by external education providers under new modes of cooperation (and finance). The decisive prerequisite for a compulsory subject of 'digital studies' would also be met when sufficient staff become available through further training and an updated degree course in teaching.

But schools will not become the primary place where students learn digital skills any time soon. It is therefore important for children and adolescents to be offered low-threshold learning options where possible outside the school system. In recent years, many regions in Germany have created 'STEM Clusters' with support from the Federal Ministry of Education and Research, which bring together existing extracurricular education initiatives and create new content and formats. A KfW initiative is 'TUMO Berlin', a media learning centre inaugurated in autumn of 2020 where young people can learn programming, design and robotics free of tuition fees. Further efforts are necessary to make high-quality digital learning opportunities available free of charge to as many young people in Germany as possible.

Supplementary coronavirus surveys by KfW Research

The various analyses undertaken to identify the impact of the coronavirus crisis on SMEs are based on regular supplementary surveys carried out as part of the KfW SME Panel. It has been conducted since 2003 as a tracking survey of small and medium-sized enterprises in Germany. It is the only representative survey of the German SME sector, making it the most important source of data on issues relevant to the SME sector and for informing policymakers. For the supplementary coronavirus surveys, all enterprises that had already participated in an earlier wave of the KfW SME Panel and had provided a valid email address were surveyed online multiple times by GfK SE on behalf of KfW on the current impact of the coronavirus crisis in the years 2020/2021. The supplementary survey underlying the analyses of this paper was conducted from 3 to 14 May 2021. Responses from approx. 2,200 enterprises were evaluated. As the survey was linked to the main database of the KfW SME Panel, the data collected enable a representative evaluation for the SME sector.

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⁸ Ibid.

⁹ Senkbeil, M. et al. (2019), [Wie gut sind angehende und fortgeschrittene Studierende auf das Leben und Arbeiten in der digitalen Welt vorbereitet? Ergebnisse eines Standard-Setting-Verfahrens zur Beschreibung von ICT-bezogenen Kompetenzniveaus \(How well are beginner and advanced students prepared for life and work in the digital world? Findings of a standard-setting procedure to describe ICT-related skill levels – our title translation, in German only\)](#), Zeitschrift für Erziehungswissenschaft, 22, p. 1359–1384.

¹⁰ Eickelmann, B. et al. (eds.) (2019), [ICILS 2018 – Computer- und informationsbezogene Kompetenzen von Schülerinnen und Schülern im zweiten internationalen Vergleich und Kompetenzen im Bereich Computational Thinking \(ICILS 2018 – Computer and information literacy of students in the second international assessment and skills in the field of computational thinking – our title translation, in German only\)](#), Waxmann, Münster.