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VOCATIONAL TRAINING
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VET TRENDS 2019

Digital Transformation – VET 4.0

▶ Digital Transformation – VET 4.0

Transitions to Work

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VET Trends 2019



BIRGIT THOMANN
Head of the "VET International"
Department at BIBB

Dear reader,

Let me take you on a tour of some current trends in vocational education and training. Over the past months, we have compiled a number of interesting contributions regarding research findings and practical experience published in our journal "Berufsbildung in Wissenschaft und Praxis – BWP" (Vocational Training in Research and Practice). In this edition, we would like to present them to an international community.

Keeping the VET system competitive and attractive

One of our motives for compiling this special edition is the continuing international interest in dual VET and apprenticeship "made in Germany". At the same time, the need for skilled labour is becoming a global and increasingly urgent challenge. In this edition, you will learn more about current VET reforms in countries like Paraguay, South Korea, and Slovakia. Their governments have attempted to introduce dual training models or establish elements of dual VET adapted to their specific needs and conditions. What inspired these reforms? Primarily, they sought to improve the quality and demand-orientation of vocational education and training, enhance participation of companies and their demands in the development and implementation of VET, and increase collaboration between the government and the private sector. These considerations are crucial to keeping VET attractive and competitive.

Maintaining the VET system's viability and appeal remains a challenge in Germany, too. In particular, the successful transition from school to work is a topic of enduring interest – after all, an apprenticeship lays the foundation for a solid professional career. Vocational orientation supports young people in mastering this transition. Family and friends or the considerations of costs, benefits, and career opportunities highly influence young people's decisions and the career choices they take. A closer look at these influencing factors is therefore worthwhile. Confidence in VET needs to become stronger.

Digitalisation: challenge and opportunity

The majority of the selected articles tackle the impact of digitalisation on the world of work and employment. The digital transformation is a rapidly unfolding development and the increased deployment of computers, robots, and artificial intelligence is radically reshaping our world. The pace of this shift will continue to accelerate in the future and there will be far-reaching effects on VET.

This development affects all areas of initial and continuing vocational education and training. It influences the structure of training occupations, the relevance of continuing training, and essential core competencies for staff as well as for teachers and trainers that must thrive in a high-tech working environment. In this context, I would like to draw your particular attention to the results of the project "VET 4.0 – Qualifications and competencies of skilled workers for the digitalised work of tomorrow" initiated jointly by the Ministry of Education and Research (BMBWF) and BIBB. Our findings show that the changes brought about by the digital transformation can also mean opportunities to boost innovation, lifelong learning, and the attractiveness of vocational education and training in the eyes of young people.

The world is moving quickly and innovation cycles are speeding up. Correspondingly, taking time to discover research-based information and good practice is becoming increasingly valuable. So, without further ado, please enjoy this issue!

Yours,
B. Thomann

Digitalisation and AI are conducive to increasing the attractiveness of vocational education and training



FRIEDRICH HUBERT ESSER
Prof. Dr., President of the BIBB

Digitalisation and artificial intelligence continue to be decisive topics within politics, trade and industry, and society. BIBB has acted in a timely manner to address the associated question as to what consequences will ensue for the world of work and employment. Extensive research and development findings now provide a basis for delivering responses.

A shapeable challenge, not a threatening scenario

The changes arriving in the wake of digitalisation and AI are now being described as challenges that can be moulded rather than as impending threats. Even though the degree of digitalisation varies in the individual economic sectors, we join the IAB in embracing the prediction that digitalisation and AI will not lead to wholesale job losses on the labour market. It is said that digital transformation will cause around 140,000 jobs to disappear by 2035. At the same time, new employment opportunities and new jobs will be created as the service sector continues to develop.

After screening a wide range of occupations, we have come to the conclusion that digitalisation and AI will help drive the modernisation of many occupational profiles. The occupation of warehouse logistics operator is one striking example in this regard. Aspects such as more control console activities, including systematic monitoring of material flow and the assumption of more responsibility for process optimisation and comprehensive quality management, will mean that they will shed their image of being “crate pushers”. Tasks in agriculture will also become increasingly complex and demanding as a result of digital herd management and the use of geo-information and farm management systems.

The individual examples which we have investigated in various occupational fields enable us to arrive at a conclusion for the occupations system in its entirety. Although the essential core tasks will be retained in most occupational profiles, particular tasks will gain considerably in significance. These mainly include those concerning information technology, including IT security. IT-aided communication will become further established. Alongside occupation-specific skills and knowledge, self-learning competence, process

and system understanding, digital competence, flexibility and spontaneity will all need to occupy a stronger position in the regulatory instruments as key core skills.

Taking advantage of the chance to create profiles at different levels

All in all, the overall situation brought about by digitalisation and AI offers good prospects of achieving a boost in the attractiveness of VET. The system level will see design options emerging in respect of profile formation and the delineation of altered occupational profiles and regulatory standards that are in line with requirements. As well as establishing 4.0 training profiles, the main focus will need to be on using attractive connective options in continuing and advanced vocational education and training to open up career prospects to skilled workers. At the governance level, much leeway will potentially be offered by openly designed training regulations, by equipping learning environments in a way which is in accordance with requirements, and by a different understanding on the part of VET stakeholders of their role and self-image. And, last but not least, new forms of learning and innovative methods for monitoring learning outcomes at the implementation level will provide enormous potential in terms of making the learning that takes place in company-based, inter-company and school-based vocational education and training more effective and therefore also more attractive.

Taking all of this on board now would be a more than wise approach! ◀

*(Translation from the German original in BWP 3/2019:
M. Kelsey, GlobalSprachTeam, Berlin)*

Changing inter-occupational competencies in the wake of the digital shift

Perspectives for the regulatory and implementation levels



GERT ZINKE
Dr., Research Associate in the
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Between 2016 and 2018, a project team at BIBB conducted occupation screenings as a part of the BMBF/BIBB initiative "VET 4.0 – Qualifications and competencies of skilled workers for the digitalised work of tomorrow".¹ The impacts of digitalisation were investigated for 14 recognised training occupations. The present article describes the approach adopted in the project and pools findings from the various sub-studies. The focus is directed towards competencies that are evaluated as being particularly important in cross cutting terms. The article concludes by outlining a proposal for how such competencies can be fostered within the framework of an altered didactic design to which training regulations are already according consideration.

Changing occupational profiles as a result of the technological shift

Occupations undergo constant development. Work tasks alter as general conditions, tools, and process sequences change. In her novel "Mittagsstunde" ("Midday Hour"), for example, DÖRTE HANSEN characterises the agricultural machinery mechanic of the 1960s as follows. "When the grass and hay season arrived, Heye Nissen no longer concerned himself with horseshoes and scythe blades. He ceased being a blacksmith and became a mechanic instead. He lay beneath foragers and hay balers, repaired drive shafts ... and hurried into the fields in dirty overalls and carrying a tool box whenever tractors stopped working or combine harvesters refused to move." (p. 218). The current occupational title of "agricultural and construction machinery mechatronics technician" very much reflects this further development. Today, work tasks in this occupation include IT-aided diagnostic tools, preventative maintenance and multi-networked data management between machines and devices, and a linked process management system. The function of this system with regard to the relationship between the manufacturers and the operators of machines is becoming ever more important. The questions which immediately arise are what the characteristic nature of the occupation will be in ten years' time and how initial and continuing vocational education and training can prepare skilled workers for changed requirements.

Early recognition of such a shift in demand is a permanent matter of concern for skills research and educational policy in equal measure.² When preparations for the BMBF/BIBB initiative began, recourse was available to investigative approaches and results that had already been applied (cf. BECKER/SPÖTTL 2008; SPÖTTL 2016; PFEIFFER 2016; WINDELBAND 2006).

Aim of the occupation screening and selection of occupations

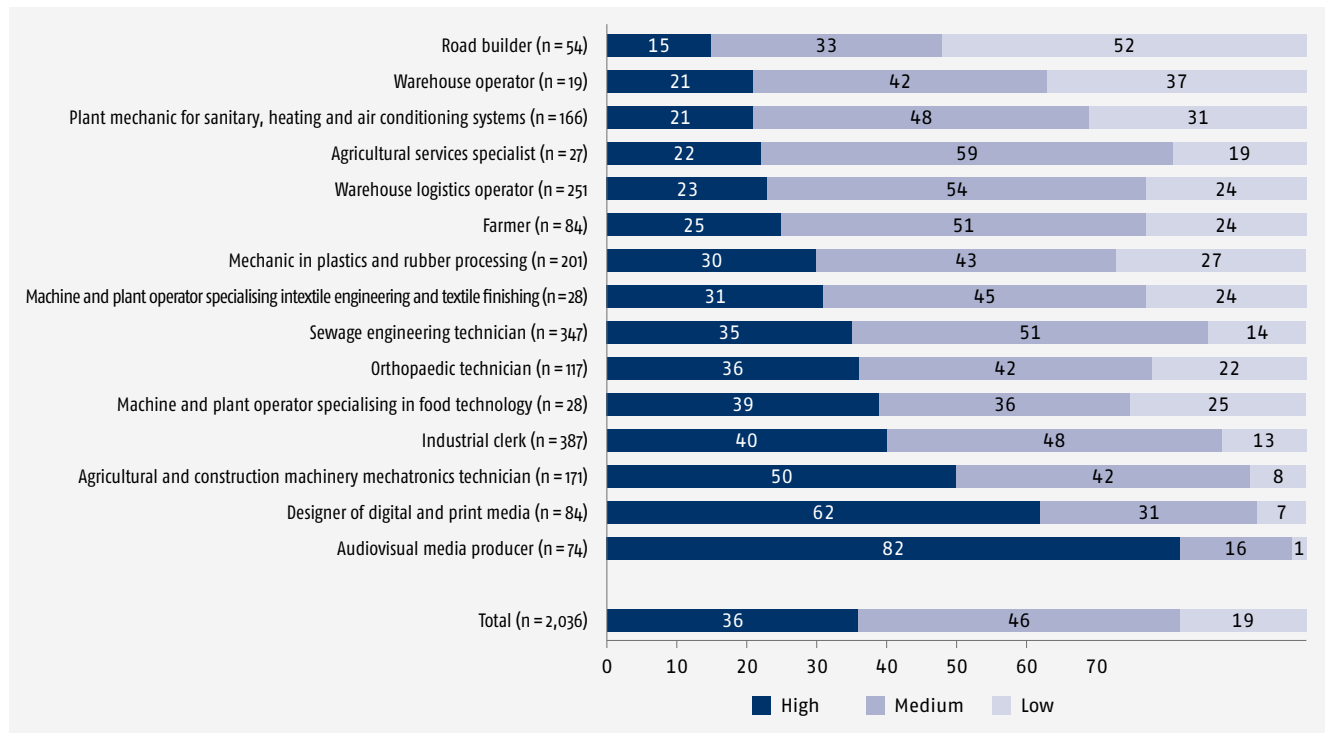
The overarching objective of the occupation screening was to use several sample occupations to achieve the early recognition, evaluation, and comparison of changes to requirements caused by digitalisation. The intention was to use this as a basis for the submitting recommendations for the design of initial and continuing VET in the occupations forming the object of investigation and for the further development of the VET system in overall terms and for these recommendations to inform the VET policy debate. The impacts of digitalisation on task structures in the workplace, on qualifications requirements for skilled workers, on the demand for skilled workers, and VET were studied via the example of 14 recognised training occupations in

¹ VET 4.0 – Qualifications and competencies of skilled workers for the digitalised work of tomorrow (term April 2016–October 2018), cf. www.bibb.de/de/dapro.php?proj=7.8.154 (retrieved: 08.04.2019)

² Cf. e.g. in this regard www.frequenz.net.

Figure 1

Evaluation of the degree of digitalisation within the work environment by training occupations (in per cent)



Source: 2018 BIBB/BMBF online survey "Qualifications and competencies of skilled workers for the digitalised work of tomorrow", n = 2,036

various branches and economic sectors (cf. Figure 1). The occupations were chosen so as to

- include as many economic sectors and industries as possible (technical, commercial, industrial, craft trade, agricultural and service sector occupations, and the liberal professions);
- cover an appropriate number of trainees, ranging from approximately 300 newly concluded training contracts per year to over 10,000;
- feature differing durations of training (two-year, three-year, and three and a half-year occupations);
- ensure that, as a rule, the most recent update of regulations had taken place at least five years previously and that no revision was immediately impending.

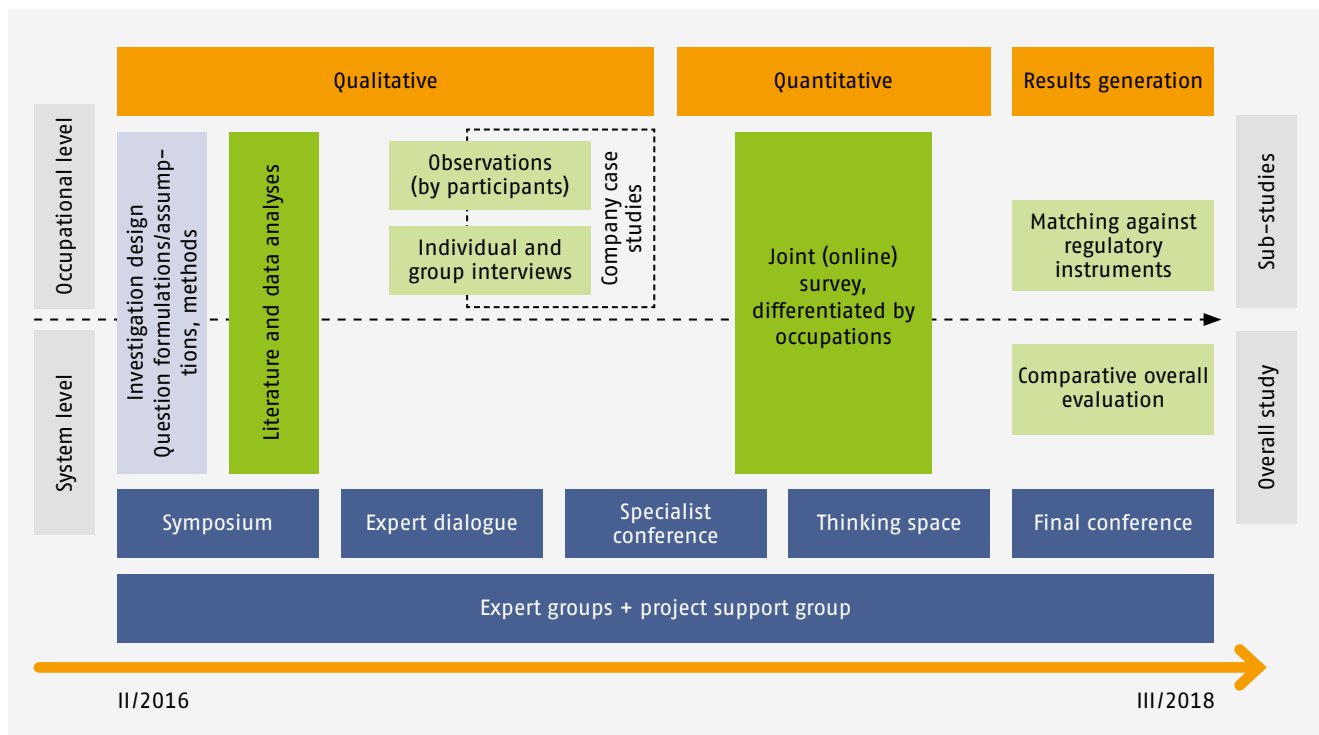
As Figure 1 illustrates, the occupations also vary in terms of the degree of digitalisation perceived at the company and occupational levels. Within the scope of the occupation screening process, skilled workers, line managers, and trainers were asked how they assess their company's current level of digitalisation within the work area of the respective target occupation.

Research design and methodological approach

The methodological approach adopted within the scope of the occupation screening took place at two levels (cf. Figure 2). At the first level (occupational level), screening of the individual occupations was conducted, and results were collated in occupationally related sub-studies. The second level (system level) involved coordination and systematic comparative evaluation of the individual sub-studies (overall study). The research design, selection of occupations, formulation of questions, assumptions, and methods were determined by the project heads in accordance with a project planning and project design action framework. More detailed specifications were made by the project team during the course of the project. These included aspects such as preparation of the online questionnaire and terminological definitions, e.g. with regard to the degree of digitalisation. External experts were included in this process. The latter comprised expert groups of between three and five members, an overall project support group, and specialists who were involved in certain areas.

Literature, document and data analyses to determine the current status of research and state of affairs within the context of occupations and VET and digitalisation/Industry 4.0 were conducted at both levels. Between four and 15 company-based case studies, preferably at pacemak-

Figure 2
Research design and methodological approach



er firms, were carried out per occupation on the basis of these partial results. The core focus was on guided interviews with skilled workers, line managers, and training managers. This was supplemented by observations from participants and/or by company inspections. Pacemakers are companies which have been identified as pioneers in the use of digital technologies within the respective training occupation environment. When selecting the companies, care was also taken wherever possible to choose firms which were typical of the training occupation in terms of aspects such as size, sector, and business model.

The partial results generated were relayed to the expert groups and made available for debate within the framework of various events formats. In order to secure an even broader basis of validity for the results, the qualitative phase was followed by a quantitative stage which began around the middle of the project term. An online survey was prepared, realised and evaluated with the assistance of an external provider, and a total of more than 2,000 returns were recorded. Most of the questions were closed and were largely identical for all occupations. In some cases, additional questions were included and/or items were adapted in an occupationally related way with regard to technologies, works tasks, and skills and qualification requirements. In each case, a final matching against regulatory instruments took place. The intention here was to investigate the extent to which current training regulations

already cover the qualification requirements identified in the investigation.

The results will be published together with the recommendations in eleven sub-studies³. The individual results will once again be compared and evaluated in the overall study, and further conclusions and recommendations will be formulated where possible. This also forms the basis for the following remarks.

Changes in competence requirements are discernible across all occupations

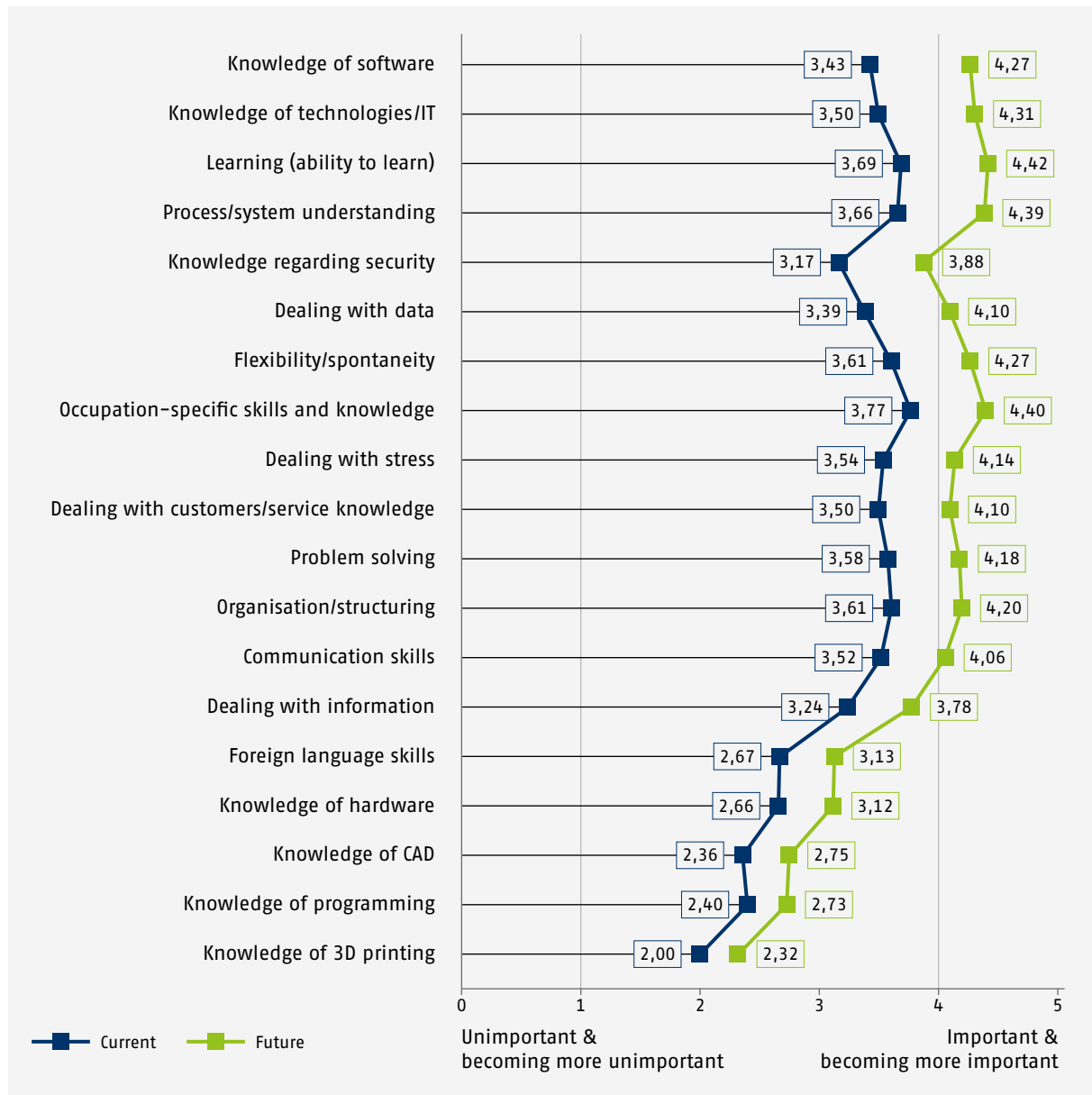
If we summarise the findings that emerge from the sub-studies, it is revealed that the digital shift is changing the skills, knowledge and competencies required in all training occupations investigated and that all competence areas are affected (professional competence, social competence and self-competence). The online survey enquired into the present and future significance of individual competencies.⁴ According to the respondents' assessments,

³ The sub-studies will be published over the course of 2019 in the BIBB series "Academic Research Discussion Papers" (cf. www.bibb.de/veroeffentlichungen/de/publication/series/list/8, retrieved: 08.04.2019).

⁴ The relevant items for the project were determined on the basis of various sources (results of the case studies, knowledge, skills and competencies included in the regulatory instruments, third party questionnaires).

Figure 3

Evaluations of the development of the importance of selected skills, knowledge and competencies



Source: 2018 BIBB/BMBF online survey "Qualifications and competencies of skilled workers for the digitalised work of tomorrow", n = 2,036

which was possibly coloured by the way in which the questions were posed, all competencies seem to be gaining in significance (cf. Figure 3). At the same time, recognisable gradations are noticeable. The following can be viewed as the most important competencies required.

- Occupation-specific knowledge and skills
- (Ability to) learn
- Process and system understanding
- Flexibility/spontaneity
- Digital competencies.

Evaluations from the perspective of individual occupations

The key question posed in the individual and group interviews to identify changed competence requirements was: "What do you believe makes a good [occupational title]? Which competencies does he or she need to possess in order to meet current and future challenges?" Catalogues of key words served as a support template, and competency cards were also used in some interviews. Responses regarding the competency "Process and system understanding" are presented below as examples for selected occupations.

Agricultural and construction machinery mechatronics technician: “Mechanical systems are steered by hydraulics and electronics, and you need to know the correlations of the processes. You need to think in processes. Mechanics, hydraulics, and electronics cannot be viewed individually. There is a huge interplay between the three main pillars. You have to be able to see this. It is also very important to carry out trouble shooting in a systematic way” (Head of Training at an inter-company vocational training centre).

Orthopaedic technician: “... but what we really need to train is a sense for processes and interfaces. And this is something completely different. I do not see it as an advantage that, generally speaking, everything can now be simply and quickly digitalised with the young generation. This is not necessarily a benefit, because they have no experience at all with processes and interfaces. It really is the case that even our very young trainees have no idea about this.” (Master orthopaedic technician and truss maker, managing director).

Mechanic in plastics and rubber processing: “Ultimately, they must once again see the process as a whole, and in terms of their activities [...], they have to gain a picture of where what they do really has an impact.” (Manager).

Industrial clerk: “When I think about the skilled workers of tomorrow, [...] the situation is that processes will constantly need to be adapted and enhanced. My view is that this is only possible if I have a transparent picture of a process and can understand it.” (Head of commercial training, major company).

These assessments allow areas of potential for the fostering of process and system competency to emerge at several levels. The most obvious of these, however, seem to be updating training occupations and the closer integration of relevant skills, competencies and knowledge. This is recommended for eight of the occupations investigated in connection with other reasons for updating. Several sub-studies also see an opportunity for the introduction of additional qualifications, within the scope of either new or amended regulations. If we turn our attention from the regulatory to the implementation level, starting points for the promotion of process and system competence are also revealed from a methodological and didactic perspective. These are outlined below.

Conceptual shift in the imparting of training contents

One possible solution from a methodological and didactic point of view is that the way in which training is structured – from the development of regulatory instruments right up until the design of time-constrained phases of teaching and learning – could abandon the inductive direction favoured up until now and replace this with a deductively aligned approach. This means that there will be

more emphasis on using the system or the process as a basis to move towards and infer individual work tasks rather than vice versa, i.e. progressing from the tasks to the system or process. This approach has already been presented in a previous study and has, for example, been gradually introduced by an automobile manufacturer (cf. KATZER/KREHER/ZINKE 2017).

Indeed, initial steps in this direction are possible on the foundations of existing training regulations. Overall systems typical of companies and occupations, the functionality of which could, if necessary, initially be presented in a simplified way and be supported by models or simulations, may act as terms of reference for the deductive approach. In the case of the automobile manufacturer, a model of an automated assembly system, which the company referred to as a works model, was selected for this purpose. This means, for example, that learning assignments or project work relating to the explanation of functionality, the documentation of a process sequence, troubleshooting or the expansion or alteration of a plant can be used as vehicles from the very outset of training. These can be used to impart action patterns that are aligned to a process and system-based philosophy. The assumption is that trainees will perceive such an approach as more respectful and more motivating than previous inductive methods that are oriented towards “basic principles”. Learning assignments and project work can be developed to this end and may also serve as a topic for future pilot projects.

In the case of a modernisation of training regulations, if such an approach were to be robustly pursued, the scheduling and organisational structure of the general training plans would need to be rearranged in such a way so as to stipulate time windows at the start of training for the kinds of knowledge, skills and competencies to be imparted. ◀

(Translation from the German original in BWP 3/2019:
M. Kelsey, GlobalSprachTeam, Berlin)

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Similar and yet different – digitalisation and its consequences for individual occupational profiles

A comparison between industrial clerks and process mechanics



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This article uses two occupations as examples to show that while ongoing digitalisation often leads to similar changes at skilled worker level if considered in general terms, closer investigation of the respective workplaces reveal that these changes exert different occupation-specific effects. Commonalities and differences in the occupations of industrial clerk and mechanic in plastics and rubber processing are highlighted with regard to technologies deployed, changed tasks and new skills requirements. The article concludes with some estimates of the further development of the two occupations given the conditions of digitalisation.

Consequences of digitalisation – greater depth of focus required

Numerous studies over recent years have looked at the issue of how ongoing digitalisation is changing work and work organisation and at which new or modified qualification requirements are emerging for skilled workers as a result of this (cf. SCHMIDT/WINKLER/GRUBER 2016; Acat-ech 2016; HAMMERMANN/STETTES 2016). The general development of occupational work in both quantitative and qualitative terms has been a further object of consideration, and relevant prognoses have been drawn up (cf. e.g. HELMRICH et al. 2016, DENGLER/MATTHES 2015). Apart from a few exceptions, these investigations are usually of a cross-occupational nature, at best branch specific (for the metalworking and electrical sector cf. bayme vdm 2016, for the plastics manufacturing industry cf. STIELER 2015).

Nevertheless, attention has on several occasions been drawn to the fact that greater depth of focus is required in order to provide a specific response to the question of how digitalisation exerts an impact on work and thus also on the qualification requirements of skilled workers. The author team of the Gesellschaft Mess- und Automatisierungstechnik (VDI/VDE IT) [Institute for Innovation and Technology of the Association of German Engineers/Association for Electrical, Electronic & Information Technologies] arrives at the following conclusion. “A workplace-related descriptive model of the Industry 4.0 world of work would be expected to include a comprehensive description

of overarching development tendencies [...] which is also supplemented by and matched against a more precise depiction of the impacts of automation and digitalisation at workplace level” (VDI/VDE 2016, p. 17).

For these reasons, the BMBF/BIBB initiative “VET 4.0 – Qualifications and competences of skilled workers for the digitalised work of tomorrow” has addressed the issue of how work is transforming at skilled worker level in specific occupations.

The results of the project confirm the significance of the occupation-specific approach. It was revealed that, although many inter-occupational commonalities were identified, major differences also exist between the occupations in some cases with regard to the scope and effect of digitalisation. This article provides a comparative representation of this for the occupations of industrial clerk and mechanic in plastics and rubber processing (referred to below in abbreviated form as process mechanic). These occupations lend themselves to a comparative analysis since they exhibit differences in respect of workplaces and products. Whereas industrial clerks in the commercial sector primarily exercise office-based activities using the computer as a tool, process mechanics represent the only typical production occupation in the plastics manufacturing industry and mainly work in factory halls on various production and processing machines. The assumption is, therefore, that digitalisation will exert a different effect at skilled worker level.

Table
Presentation of the data basis

	Mechanic in plastics and rubber processing	Industrial clerk
Company case studies	7	9
Expert interviews (total)	17	38
of which skilled workers	5	18
of which management staff	8	5
of which training managers	4	15
Online questionnaires suitable for evaluation* (total)	201	399
of which skilled workers	35	105
of which management staff	102	91
of which training managers	145	306

* The total number of respondents from the three groups exceeds the total number of questionnaires because multiple responses were possible.

Study design, methodology and data basis

In order to identify the consequences, a multi-method design comprising a qualitative and a quantitative phase was selected. A data basis has been compiled in the Table for both of the occupations investigated. The differences in the number of company tours and interviews result from the fact that industrial clerks work in various sectors, each of which needed to be covered by company visits and interviews. In the case of the questionnaires, divergent figures are caused by the differing return rates. Preparatory steps for the individual investigations, survey instruments and results were discussed with an occupation-specific expert group for each occupation.

Changing workplaces

The analysis was conducted in accordance with the following questions.

1. Which digitalisation and networking approaches are to be found in company practice?
2. How does digitalisation change tasks in the respective occupations?
3. Which (new) competence requirements emerge for skilled workers as a result?
4. What consequences do the results have for the understanding of the nature of the occupation and for the development of the occupation in overall terms?

Deployment of technology

Digital technologies entered the conventional work areas of industrial clerks many years ago. Management control programmes (the predecessors of so-called enterprise resource planning [ERP] systems) were already being devel-

oped in the 1970s. These were used in rudimentary form by some companies for the purposes of data storage and analysis (cf. HESSELER/GÖRTZ 2007). Neither does the use of digital technology represent anything new for process mechanics. The automation of processes, the deployment of sensors and of open and closed loop control engineering and the systematic recording of operational data have all been standard practice in the plastics sector for decades. By way of contrast, the networking of internal and external systems would be a new development. However, virtually no sign of this can be identified for process mechanics thus far. It is also something which cannot be sufficiently quantified in the commercial sector. Nevertheless, the qualitative interviews give rise to the supposition that networking in the commercial sector may be far more heterogeneous than is the case with regard to pure IT saturation*. The spectrum ranges from working with stand-alone solutions at the company to the extensive interlinking of a company's own system with external systems. An example of the latter may be connecting the ERP systems of companies with the systems of major suppliers by using an interface, via which orders can be automatically transmitted to the customer as required and displayed in the customer's system.

In the case of the industrial clerks, it is also particularly noticeable that no difference is revealed concerning company size both in respect of the use of various technologies and with regard to the type of networking. The situation in plastics manufacturing presents a different picture. The interviews already made it apparent that digitalisation is more difficult for SMEs to achieve because of financial hurdles and in some instances due to insufficient digital infrastructure. Within the scope of the written question-

* 92 per cent of respondents state that their company uses at least three of the technologies that have been identified as important for the commercial sector.

naire too, respondents from small and medium-sized enterprises tended to evaluate the degree of digitalisation at their company as being low. Respondents from firms with a large number of employees were more likely to indicate a high level of digitalisation.

In the case of both occupations, it is possible to ascertain that the technologies currently being deployed should mainly be allocated to the field of software and thus particularly serve the purposes of data handling or control and monitoring of production processes. Technologies which are typical of Industry 4.0 (3D printing, augmented/virtual reality, collaborative robots), which would lead to a deep-seated change to production and process sequences, tend at present to play a less significant role for both industrial clerks and process mechanics.

Changing tasks

A similar tendency is displayed in both occupations in this respect. Monitoring tasks are increasing. In the case of process mechanics, this is also resulting in a shift away from primarily physical tasks and towards mental activities. This means that there is a rise in cognitive requirements for the fulfilment of some tasks and a fall in these requirements in respect of other tasks. One manager notes: *“The systems are taking on more and more tasks [...]. You get told what you have to do. That is one side of the coin. The other is that systems simply need to be kept going. I need to intervene, I need to be familiar with the system and I need to know what I am doing. [...] I have no idea whether the occupation of process mechanic will develop further in two directions. One direction simply involves monitoring and doing what you are told [...]. The other direction, which actually has a higher requirement, is someone who [...] really understands and can influence systems and can ensure that what someone else is told to do is right.”*

The routine tasks of industrial clerks are undergoing increasing automation, and processing is monitored. More complex tasks remain, and for this reason a general increase in cognitive demands can be observed here. One example of this is invoicing. Because most data is stored in the system, invoices can largely be prepared via an automated process. *“Work is shifting from doing to controlling.”* (Manager). The skilled workers need to intervene and draw up an invoice in the conventional way if problems occur and/or if a case turns out to be particularly challenging. In such a situation, the skilled workers will need to be able to find, understand and remedy possible errors.

Whereas the industrial clerks mostly perceive this change as being positive, for the process mechanics it means a distancing from the product and thus also affects the question of occupational identity. *“Of course, if this keeps continuing, then I don't know how I will identify with what we actually*

do. Am I producing a carton of milk or a car tyre or what?” (Manager).

Skilled workers in both occupations level the critical assertion that digitalisation also makes it possible to monitor workers and their performance. Digital technologies permit precise tracing of which employees have instigated which processes at which point in time and of their overall work performances within a certain period. This increased transparency is perceived as a burden by most of the skilled workers. One manager notes: *“I record more data. Suddenly, I am also able to analyse this data. This means in turn that I can assign the order to machine operator X, whereupon I have just seen that the order has been completed below the target speed on multiple occasions. This gives rise to anxieties. [...] Will I lose my job if I put in a few performances which are worse than those of my colleague [...] from the other shift? Things become transparent.”*

Changes in qualifications and skills requirements

The question as to how the skills demands made of skilled workers will change in the wake of digitalisation formed the core of the present project. At first sight, the results obtained in this regard did not offer much new information compared to cross-occupational studies already conducted. Thus, the outstanding relevance of social competences and above all the ability for lifelong learning, is also emphasised here. Other aspects stated as relevant are process knowledge, general IT skills and the handling of data and knowledge within the area of data privacy and data security. However, if taking a closer look at the competences mentioned, it is certainly possible to identify occupation-specific differences. The intention here is to illustrate this on the basis of the examples of “Handling of data” and “Knowledge in the area of data privacy and data security”. For process mechanics, the handling of data involves identifying and analysing relevant data, i.e. creating connections between the data and the reality it represents and ultimately using this as a foundation for decision making. The topics of data privacy and data security play only a marginal role, because process mechanics usually only receive and analyse data rather than generating or sharing it. This situation is different in the case of the industrial clerks. In areas where personal data is processed, such as in sales and human resources, knowledge and application of data protection are essential. Dealing with sensitive personal data requires clear regulations with regard to storage in the systems, and skilled workers will need to know and comply with these. They must know which information they can make available and which permissions they have and will also need to be able to anticipate effects. It is also important in this regard to consider the opportunities which exist for third party access, especially if data is

stored in the cloud. Unlike process mechanics, industrial clerks also need to research data and require an ability to evaluate data sources. They should also be in a position to check, manage and administer data which has been collected and received.

The level of responsibility associated with handling data thus rises for both occupations because, for example, decisions which previously would not have arisen due to the absence of available information (data) or would have been taken at a higher hierarchical level, now need to be made. The new skills requirements emerging for industrial clerks in connection with data handling are, however, much more wide ranging than those faced by process mechanics.

Development of the occupations

The influence of digitalisation on the continued existence and development of occupations is a much discussed topic. Alongside statements relating to quantitative changes, such as those made by FREY/OSBORNE (2013), these have also been propounded in respect of qualitative developments (cf. VDI/VDE 2016, KINKEL 2008), i.e. with regard to the development of the requirements level for skilled workers. Differences in both the forecast quantitative and qualitative changes can be identified with regard to both occupations forming the object of investigation here. The majority (59%) of the process mechanics surveyed expects that digitalisation will lead to a rising demand for skilled workers. Only two per cent are of the view that demand will decline. By way of contrast, most (56%) of the industrial clerks postulate that demand will remain the same, and 19 per cent even expect a fall.

Further differences are revealed with regard to the future requirements level. In the case of the process mechanics, a *polarisation* is indicated between an increase in simple tasks which can also be completed by semi-skilled and unskilled workers on the one hand and a rise in complex tasks which require a qualification level beyond that of current training on the other. This higher skills level is, however, explicitly not seen in the academic field. Conversely, with regard to the industrial clerks, tendencies are shown towards a so-called general upgrading, i.e. a rising qualification level for all skilled workers.

Consequences for vocational education and training

The results portrayed demonstrate that the consequences of digitalisation are very different in occupation-specific terms, although these differences do not in some cases become apparent until deeper analysis has taken place. This means that the consequences to be drawn for the further development of the occupations will also need to vary.

For the occupation of process mechanic, for example, driven by the tendency towards the polarisation of competence requirements, the fundamental question of a uniform occupational profile arises. If the intermediate qualification level disappears, it could be useful to ponder a split into a higher and lower qualified version of the occupation. Furthermore, in light of the identifiable increase in cognitive and monitoring tasks and the growing distance from the materials processed and products manufactured, consideration should be given to the target group of trainees. Whereas an interest in the materials of plastic and rubber and manual skills have always been the central aspects up until now, it may be possible in future to focus on trainees who have less interest in the materials but display an affinity with the specific production technologies and the associated digital technologies.

As far as industrial clerks are concerned, the consequences of digitalisation primarily lie in a more demanding set of requirements and impending academisation. The systematic interlinking of initial and advanced training could increase the attractiveness of a career in the occupation and enable the necessary training to be implemented. Additional and more detailed contents could be introduced such as data handling which, as mentioned above, is becoming more complex for industrial clerks in the wake of digitalisation and is associated with numerous new requirements. ◀

*(Translation from the German original in BWP 3/2019:
M. Kelsey, GlobalSprachTeam, Berlin)*

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“What happens in the field is crucial!”

Curricular and practical consequences of digitalisation and networking in agriculture



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How are tasks and competencies in the agricultural sector changing as a result of digitalisation and networking, and how does vocational education and training need to react? On the basis of technology deployed, this article investigates the issue of how skills, knowledge and competencies are currently changing in the recognised training occupation of farmer, and which requirements and consequences this is creating at the curricular and practical level. In light of the growing significance of process and system competencies and handling data, the teaching module “Information-based agricultural technology” will be used as an example to show how competencies relating to the systematic use of production data can be practically imparted and how trainers can be supported in their daily work.

Agriculture 4.0

Dealing with heterogeneity and diversity does not only impact upon vocational teaching activities. Such an approach is also taking hold in agricultural crop farming in a bid to act in a way that is suitable to the location. This is then referred to as “precision farming”, or the specific cultivation of certain areas. The focus here is on identifying properties that exhibit local differences, such as in the supply of nutrients, in order to enhance qualities and yields by applying adapted land use intensities. Information from various sources – including soil, biomass and yield maps – is linked together for this purpose. This data is then supplemented by knowledge and experience in regards to the characteristics of a piece of arable land in order to be able to draw the right conclusions. The resultant areas of potential a location is able to offer are stored in a file in a sector specific way. Data relating to the nutrient requirements of different partial plots is, for example, then generated in the form of an application map. The farmer transfers this information to their tractor’s on-board computer and sets up the fertiliser spreader by means of an app. Spreading then takes place with the assistance of a global navigation satellite system.

Changes in occupational activities of this nature, which have been triggered by digitalisation and networking, have been talked about for many years within the context of Industry 4.0. Within the scope of the initiative “VET 4.0 – Qualifications and competencies of skilled workers for the digitalised work of tomorrow”, which was implement-

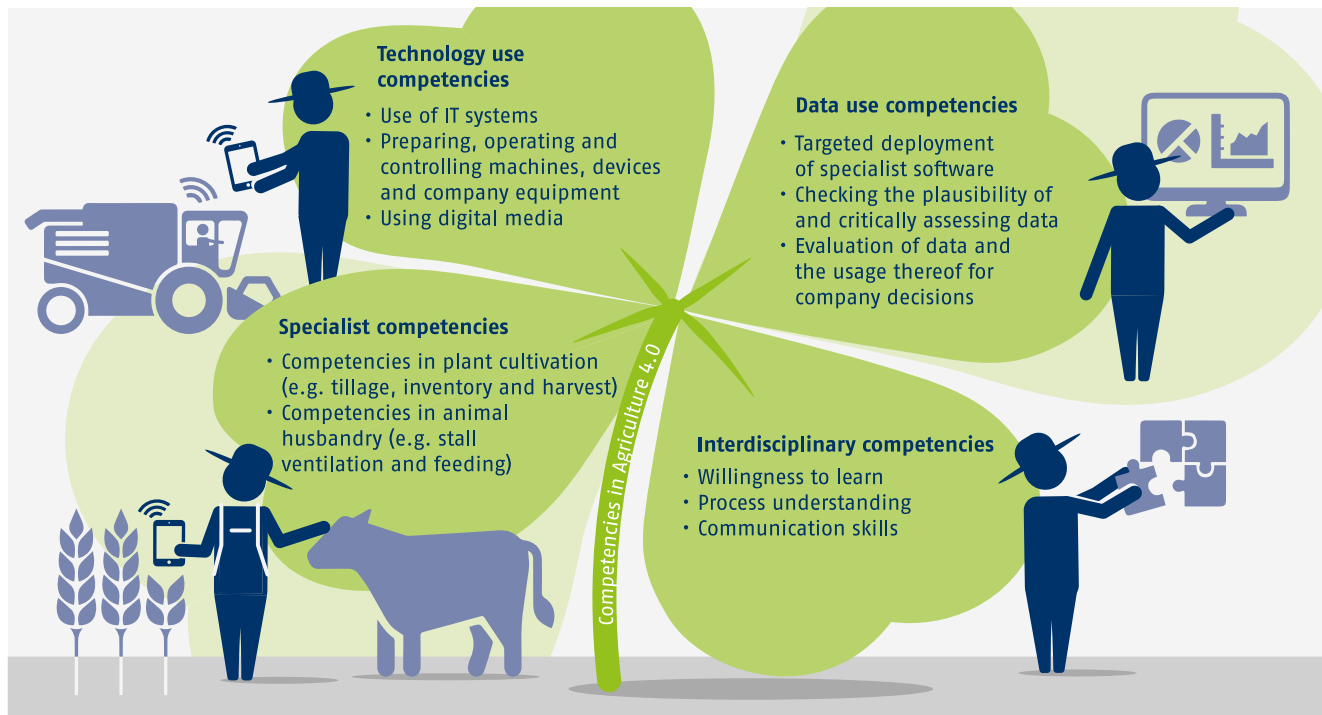
ed by the Bundesministerium für Bildung und Forschung (BMBF) [Federal Ministry of Education and Research] and BIBB between 2016 and 2018, a technology, occupation and qualification and skills screening process was also deployed in order to adopt an “Agriculture 4.0” perspective and to subject the training occupation of farmer to closer investigation (for more details cf. BRETSCHNEIDER 2019). The starting point for this procedure was a branch-related sectoral analysis, which served to develop occupation specific guides for expert interviews and for the selection of company case studies. A total of 58 persons were interviewed at an operational and strategic level. Some of these interviews were conducted within the framework of nine case studies of different branches within the agricultural industry. An online survey directed at skilled workers, managers and training managers was also carried out (cf. Table 1).

The questions were aligned to the occupational profile items in the existing training regulations and were also guided by indications and findings that emerged from the expert interviews and case studies. The study was supported by a group of experts from practice and politics.

Changes to tasks and competencies

At the tasks and activities level, the first fundamental observation is that production processes are increasingly subject to digital, networked and in some cases autonomous control. In this sense, 70 out of the 88 online respondents

Figure
Main skills, knowledge and competencies for Agriculture 4.0



Source: Online survey within the scope of the BIBB/BMBF initiative "Qualifications and competencies of skilled workers for the digitalised work of tomorrow"

believe that dealing with data that relates to operational processes and the optimisation of such procedures will grow in significance in future. 17 persons are of the view that the situation will remain the same. Results regarding the monitoring and documentation of operational

sequences and processes produce similarly high values (69 of 88 respondents think that the significance of this will increase, 18 are of the opinion that the level of importance will stay the same). Changes to tasks and activities in crop production and animal husbandry are not judged to be quite as significant. 48 respondents categorise these as staying the same, and only 35 and 31 persons expect a growing importance.

In overall terms, we may conclude that tasks and activities will either become more important or will at least retain their current significance. No tasks which will decline in significance could be identified. As a consequence, the spectrum of tasks and activities will expand as digitalisation and networking increase. This will mean that skilled workers "will still need to gain a professional qualification and will now also require a technical qualification at the same time" (LaWi/FKA – Interview 23 – manager). Because farmers generally only use IT systems rather than programming or setting them up themselves, another result of the investigation is that there will be a need for support from external IT providers.

If we consider the assessments given by the respondents regarding the necessary skills, knowledge and competencies against this background, then the results of the online survey reveal a significant rise in importance in the areas of "Dealing with technology" and "Dealing with data" (cf. Figure). Aspects affected include the following.

Table 1
Database

Method	Cases/ number
Company case studies	9
Expert interviews (total)	58
of which company-based skilled workers	17
of which company-based management staff	13
of which professional associations	8
of which chambers	6
of which federal institutions	5
of which inter-company training	3
of which vocational schools	1
of which institutes of higher education	1
of which others	4
Online questionnaires suitable for evaluation (total)	88
of which skilled workers*	15
of which management staff*	30
of which training managers*	63

* Multiple responses possible

- Targeted deployment of specialist software (67 of 88 responses)
- Use of IT systems (65 responses)
- Checking the plausibility of data (62 responses)
- Evaluation of data and use for company decisions (59 responses).

Although on the one hand there are reports of a simplification of tasks and activities in physical terms, the necessity to set up and operate machines also means a rise in requirements at the cognitive level.

Within this context, 58 of the 88 respondents also ascribe growing significance to the critical evaluation of information. The expert interviews also draw attention to the critical attitude needed when checking for inaccuracies in data recorded by sensors. “A farmer must always be in a position to maintain operations, even if there is no electricity or network access,” (LaWi/FKA – Interview 5) stated one manager. Skilled workers bear a particular responsibility when dealing with crops and living animals. Within this context, there is now an added connotation to one of the contents firmly established in the present training regulations:¹ “Recognise procedures in agricultural operations with one’s own senses, in particular with regard to crops, animals and technical processes, identify changes and draw conclusions.” This does not in any way deny the areas of potential afforded by digital systems. Nevertheless, direct proximity to plants and animals is a key characteristic defining the identity of this occupation.

Consequences at a curricular and practical level

The changes described give rise to the questions as to what the appropriate reaction should be. Are adjustments at the level of regulatory instruments necessary, or should the focus be more on practical training?

Modernisation in terms of curriculum not required

Even though the existing training regulation has been in place for the comparatively long period of just under 25 years, the experts surveyed do not believe that modernisation is currently absolutely essential because of the digital shift. This may appear surprising at first glance. However, the specific structure of the training occupation provides both technologically neutral formulations and a high degree of flexibility. It encompasses a total of 17 branches from the two areas of crop production and animal husbandry (cf. Table 2).

Trainees are required to select two branches from each area. This means that it is possible to tailor training very closely to individual requirements. The formulations contain a high degree of abstraction as a consequence of the

Table 2

Branches of agriculture included in the recognised training occupation of farmer

Crop production	Animal husbandry
Grain cultivation	Dairy cattle farming
Sugar beet growing	Cattle rearing or fattening
Potato cultivation	Sow management and piglet production
Grain maize cultivation	Pig rearing or fattening
Oil seed cultivation	Laying hen husbandry
Pulse cultivation	Poultry rearing or fattening
Arable feed production	Sheep husbandry
Grass land or pasture land	Horse keeping
Forestry	

fact that the skills, knowledge and competencies to be imparted need to be realisable in each of the 17 branches. At a curricular level, formulations such as “Handle and maintain machinery, tools and works equipment” or “Operate feeding and drinking systems” (cf. farmer ordinance 1995) thus protect training contents against a “natural ageing” to a certain degree. As a consequence, the assessment of the persons interviewed is that current developments can (currently) fundamentally be mapped against the existing general training plan. Nevertheless, the introduction of an integrative occupational profile item of “Digitalisation of work, data protection and information security”, such as that which entered into force in the industrial metal working and electrical occupations as of 1 August 2018², could represent a possible low threshold update.

What does this now mean for practical training? The company plays a key role in this regard. “What happens in the field is crucial!” The company providing training and the specific prevailing facts and circumstances of such a company set out important general conditions for competence acquisition when dealing with digitalisation. With regard to process management for the recording, analysis, monitoring and evaluation of data evaluation, the securing of a continuous data flow – such as within the context of the specific cultivation of agricultural areas – emerges as a new competence on which attention needs to be focused.

¹ Cf. Ordinance on vocational education and training in the occupation of farmer of 31 January 1995 – Federal Law Gazette, BGBl. I 1995 No. 8 of 16 February 1995, pp. 168–178

² Cf. Ordinance on Vocational Education and Training in the industrial electrical occupations of 28 June 2018 – Federal Law Gazette, BGBl. I 2018 No. 23 of 5 July 2018, pp. 896–974

Supporting practical training with supplementary teaching modules

In order to support training at agricultural companies, the Dienstleistungszentrum ländlicher Raum Rheinhessen-Nahe Hunsrück (DLR RNH) [Service Centre for the Rural Area of Rhinehessen-Nahe-Hunsrück] has developed a teaching module entitled “Information-based agricultural technology”. This is used to instruct future skilled workers in the State of Rhineland Palatinate in the creation of a data basis and in the application and evaluation of data within the scope of their inter-company training. The starting point here was a project headed by the Deutsches Forschungszentrum für künstliche Intelligenz (DFKI) [German Research Centre for Artificial Intelligence] between 2009 and 2012, which was used to support farmers in making decisions regarding yield optimisation and sustainability in crop production (cf. DFKI 2014).

The result was a 36-hour training concept – now expanded to encompass 80 hours to trace the stages of precision farming. Before this provision is delivered, a foundation is created by imparting competencies to handle spreadsheets, farm programmes for the planning and documentation of operations, and mobile apps. Beginning with the basic principles and possible deployment of automatic steering systems, the first step then involves the drawing up and use of digital maps for seeding, fertilisation and plant protection. This is followed by learning how to deal with guidance systems and how to evaluate the records of vehicle movements. The final stage focuses on yield maps, the linking of digital cartographic material, and sensor-aided fertilisation. Teaching units take place over the period of one day in groups of six or seven persons. Participants complete theoretical and practical training at three different learning venues at the site. The necessary equipment is made available by agricultural engineering companies. This also enables an insight to be gained into the systems of different providers. The module now forms an integral component of inter-company training. It was originally developed for pupils working towards the qualification of state certified technician in the specialism of agriculture.

The results of the investigation conducted by BIBB also show that training provision of this nature can be supplemented by the design of sample teaching and learning situations to support company-based trainers in their daily work. Conceivable approaches here include the use of guided texts to develop competencies on the basis of a self-contained activity. The “Agrar” Educational Server of the Federal Agriculture Information Centre already contains a range of materials used in eight of the 14 agricultural training occupations, including farmer. The topic of digital technologies could be added (www.leittexte.de, retrieved 09.04.2019).

Autonomous technology or autonomous skilled workers?

From the point of view of the respondents, the changes described have thus far been perceived as a further development rather than as a new departure. This also ties in with the observation that companies are frequently cautious about pursuing digitalisation and initially tend to deploy stand-alone solutions. An inhibitory effect may sometimes be exerted by Internet provision in rural areas and by a lack of system compatibilities. For this reason, caution needs to be exercised in drawing conclusions for the modernisation of training regulations. The findings that emerge from the investigation relate to “pacemaker companies” in many cases and cannot automatically be transferred to all companies (providing training). Rapid technological progress in combination with the multitude of agricultural engineering providers is not the least of the reasons why growing significance is being attached to inter-company and school-based training in terms of creating a systematic overview of the current status of development and of the benefits, prerequisites and limitations of technologies. However, dealing with different company preconditions, different branches and different digital systems also represents a challenge which arises for the design of examinations. The question as to which standards with regard to breadth and depth should apply in order to map company practice which is extremely heterogeneous is also a matter of concern for the examination boards. Another issue potentially arising is how to secure the competence development and, to a greater extent, the competence retention of independently acting and self-reliant skilled workers who are dealing with autonomous technologies. The focus here needs to be on finding the right mixture between automatic control and control by skilled workers so as to enable the systems to act as genuine assistance systems. ◀

*(Translation from the German original in BWP 3/2019:
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Management assistants for e-commerce – a new training occupation from 1 August 2018

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With the boom in the online trading of goods and services, the significance and scope of e-commerce is growing across all industries. New areas of activity and new organisational and business models are emerging. To meet the growing need for skilled workers in e-commerce a new commercial occupation has been created. The article highlights the background to the revision of the training regulations and describes the occupational profile.

Varied aspects of e-commerce

The online trading of goods and services is booming. As a sales channel, e-commerce is used not only by wholesale and foreign trade, and by retail and the tourism industry, but also by manufacturers and service providers. In addition to purchasing and sales processes, it also embraces services provided within the customer service and online banking sector. It focuses on electronic business transactions taking place between a company and a private individual or end customer (business-to-consumer) or between two companies (business-to-business). Internet trading is not only conducted by large mail-order companies but also increasingly by stationary retail to accommodate changing consumer behaviour and to open up further sales channels. Additional digital sales channels can be used for customer-base visibility and to ensure you are not overlooked in their purchasing decision – as they search for products and compare prices. Retailers and multichannel traders therefore require qualified personnel. Furthermore, over the course of advancing digitalisation, increasing numbers of start-up companies are exploiting the ongoing transformation in sales channels and structures because it gives them the opportunity of operating, for example, without renting a premises or warehouse and, as a result, with much reduced business risk.

Organisation and use of new sales channels

In terms of the customer, the entire process from building awareness on the internet, to presentation of the offer and customer-specific information through to the overall presentation of the shopping basket and exchange of services (goods in return for payment) is significantly different in the virtual environment compared to stationary retail. The use of digital sales channels requires the creation of a website which needs to be run from a technical perspective, populated with content and designed in a user-friendly manner. And here, where there is an absence of personal contact, the product range, advice and marketing of other solutions need to be presented as per the “analogue business”; and methods of payment and distribution channels also need to be designed specifically for the customer.

Revision process

When the training occupation of management assistant for retail services was revised – this entered into force in 2017 – an elective qualification “online trading” was introduced. A period of 13 weeks was included for this as part of the training. This was not able to accommodate the wide-ranging and specific needs of e-commerce beyond the immediate context of retailing. The numerous interfaces with other occupations such as retail service management assistants, wholesale and foreign trade management assistants, media agents for digital and print media and dialogue marketing services managers meant that a stand-alone, cross-sector occupation was necessary.

For this reason, the creation of a new training occupation was suggested as early as 2015 (cf. MALCHER 2015) on the initiative of the Handelsverband Deutschland [German Retail Association]. The restructuring process, including the development of the framework curriculum for vocational schools, was completed at the end of May 2017. This has meant that implementation in practice can begin as early

as possible and that companies and schools are being given time to prepare for the new occupation before it enters into force on 1 August 2018 (cf. BGBl. I 2017 No. 78, p. 3926). The social partners and industries involved in the process, which are represented by experts from retail, wholesale and foreign trade companies, service companies and logistics and tourism, have agreed on a mono-occupation – i.e. an occupation without specialisms – which is appropriate and acceptable to all those involved despite differing and, in some case, sector-specific requirements. This has resulted in a high degree of flexibility – extending beyond sector boundaries – for future skilled workers and for companies when recruiting both the next generation and skilled workers. The examination regulations follow the extended final examination model. In the first part of the final examination model, following one half of the duration of training, there will be a written exam on the first 15 months of the training content in the areas of product range management and contract initiation. The result will comprise 25 per cent of the overall grade. The second part of the examination then covers the areas of business processes, customer communication, economics and social studies as well as an oral examination on a project related process in e-commerce.

What distinguishes the new occupational profile?

Management assistant for e-commerce is the first new commercial occupation for more than ten years. It specifically offers commercial qualifications focused on digital business models. It opens up the opportunity to systematically introduce trainees to the new requirements associated with digitalisation and changed consumer behaviour. Management assistants for e-commerce also learn to manage the changing sales channels and structures of e-commerce. The profile of skills and competencies includes the following:

- Design and ongoing development of ranges of goods and services
- Evaluation, utilisation and ongoing development of e-commerce sales channels
- Management of online portals and online shops, and provision of support to procurement
- Use of tools for commercial management and monitoring in e-commerce
- Creation of interfaces with other sales channels
- Evaluation and selection of communication channels
- Organisation of internal and external communication
- Preparation and implementation of online marketing measures
- Initiation and processing of contracts for online goods and services
- Evaluation and use of different payment systems
- Compliance with legal regulations for e-commerce
- Application of project-oriented working methods in e-commerce

Future trainees should be able to recognise and understand the importance of new digital developments for their own area of work and implement these accordingly. An affinity for media is helpful as is an interest in addressing the developments in online selling and in distribution channels. In particular, this requires a willingness to understand changes as productive challenges and to actively develop solution concepts.

Outlook

Between now and when the regulation enters into force, experts, industry associations and unions involved are promoting the new training occupation at numerous events in Chambers and companies. An implementation aid was published in the BIBB series “Ausbildung gestalten” [Structuring training] (www.bibb.de/de/berufeinfo.php/profile/apprenticeship/261016) to support training practitioners. The social partners intend to develop an advanced vocational training regulation to establish ongoing career opportunities for management assistants for e-commerce following completion of their training.

In light of the rapid development within online trading, the BIBB believes it makes sense to monitor the development of this new occupation with regard to the potential need for change or adaptation. ◀

*(Translation from the German original in BWP 3/2018:
M. Lee, GlobalSprachTeam, Berlin)*

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Which role do education and training play in the digital transformation process?

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The focus of the digitalisation debate is often centred on technological progress and its diffusion into company processes. Less attention is accorded to the endeavours undertaken by companies to impart required competencies. This article uses the BIBB Training Panel to investigate the correlation between company promotion of competencies and use of technology.

Investments in education and training and technology – a question of size?

Employees play an important part in digital transformation; their many years of experience allow them to use the competencies they have acquired to shape the change (cf. PFEIFFER 2018). For this reason, the intention is to investigate the correlation between promotion of staff competencies and the degree of digitalisation at a company. Larger firms are more likely to have the opportunity to offer continuing training (cf. JANSSEN/LEBER 2015) and to invest in digital technologies (cf. GRIMM/BRITZE 2018). Nevertheless, the German economy is heavily sustained by SMEs (cf. SÖLLNER 2016). It is therefore important to monitor whether digitalisation will in fact become a "game for major players" or if small firms will be able to keep up.

Measurement of education and training orientation and of the degree of digitalisation

The BIBB Training Panel (cf. Information Box) differentiates between three types of company-funded advanced and continuing training.

1. Continuing training measures in the form of courses and seminars
2. Continuing training measures that do not take place in the form of a course, such as induction in the workplace or self-directed learning
3. Upgrading training that leads to the acquisition of rec-

ognised advanced training qualifications, i.e. formal qualifications at a higher level.

78 per cent of companies supported at least one of these three types of education and training in 2017. In 2016 or 2017, 33 per cent of companies had at least one trainee pursuant to the Berufsbildungsgesetz (BBiG) [Vocational Training Act] or Handwerksordnung (HwO) [Crafts and Trades Regulation Code] and are thus considered companies providing training for the purpose of this analysis. The BIBB Training Panel recorded the use of 13 technologies in order to identify a company's degree of digitalisation. The level of digitalisation was evaluated in quantitative terms by drawing up a linear index of these technologies, which was then converted into a three-point scale comprising a low, medium, and high degree of digitalisation (cf. WELLER/LUKOWSKI/BAUM 2019).

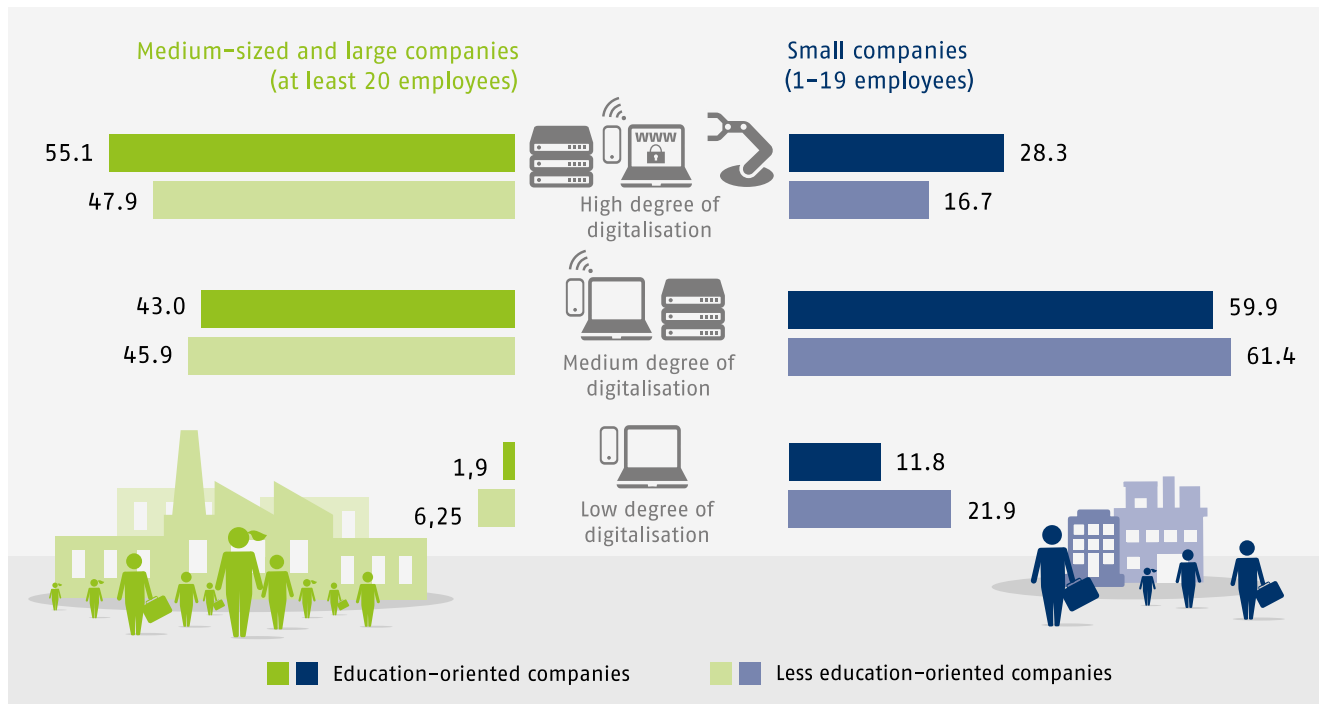
The correlation between promotion of competencies and degree of digitalisation is investigated by defining companies, which are more or less education-oriented. Companies which provide training and, in 2017, supported at least one form of advanced and continuing training were stipulated as being oriented to education and training. Companies, which do not currently provide training and/or do not support any types of advanced and continuing training are deemed to be less education-oriented.

BIBB Training Panel

The BIBB Establishment Panel on Training and Competence Development (BIBB Training Panel) is a survey which has been conducted annually since 2011. It is used to collect representative longitudinal data on the training activities of firms in Germany. Around 3,500 firms take part. Selection takes place via a disproportionately stratified sample of the statistical population of all companies with one or more employees subject to mandatory social insurance contributions. The focuses of the survey are companies' initial and continuing training activities, the recruitment of skilled workers, and company organisation. Data is collected via computer-aided personal interviews (CAPI). An ongoing module relating to digitalisation of the world of work was introduced in 2016 (for more information, cf. www.bibb.de/qp).

Figure

Correlation between orientation to education and training and degree of digitalisation separated by company size (in per cent)



Note: Company sizes are adjusted to the weighting variable.

Source: BIBB Training Panel, 2018 survey wave, n = 3,376, cross-sectionally weighted and extrapolated results.

Link between education and training orientation and degree of digitalisation

In comparative terms, companies that are oriented toward education and training are more than twice as likely to display a high degree of digitalisation as companies which are less so oriented. Around one fifth of companies that are less oriented toward education and training possess a low degree of digitalisation. This positive correlation between orientation to education and training and digitalisation is not only driven by medium-sized and larger companies. Although larger companies generally tend to be more digitalised, smaller firms have been shown to potentially exhibit a higher level of digitalisation if training of skilled workers is supported (cf. Figure).

Further research is required

The results show a significant positive correlation between training of skilled workers and a company's degree of digitalisation. Companies which are more oriented toward education and training also use more digital technologies. Education and training as well as digitalisation play a particular role within the scope of a company's overall strategy. It should be emphasised that this can be observed both for

small firms and for medium-sized and large companies, albeit to differing degrees. Nevertheless, the influence which education and training exert on each other – i.e. if more training brings higher digitalisation in its wake or vice versa – remains unclear. The relationship between digitalisation and training is also one of the subjects covered in the interview with Professor RICHARD MÜNCH, which was conducted within the scope of the BIBB Polarisation Project.* Further research into these dynamics is required. ◀

(Translation from the German original in BWP 3/2019:
M. Kelsey, GlobalSprachTeam, Berlin)

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Digital transformation and support requirements from the perspective of company-based training personnel

Lessons learned from the BMBF programme JOBSTARTER plus

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The aim of JOBSTARTER plus projects concerning “Initial and continuing VET in economy 4.0” is to support small and medium-sized enterprises in adapting their training and continuing education to the challenges of advancing digitalisation. At the start of their work, the projects asked companies about the specific support requirements. This article puts together the assessments resulting from this. They provide an insight into the perspectives of training personnel, and the support required.

Digital training still in its infancy in the training system

No sector of the economy and virtually no company remains unaffected by digitalisation. However, according to the findings of the Bertelsmann Foundation’s “Digital training monitor” (cf. SCHMID/GOERTZ/BEHRENS 2016) digital training in the dual training system is still in its infancy. A current investigation by the RKW centre of excellence supports this assessment (cf. HOFFMANN 2018). It shows that, in general, internal processes are initially impacted by digitalisation with the aim of optimising procedures and controllability. Next come schemes relating to customer communication. Digitalisation plans finally target the development of new, or enhancement of exist-

ing, products and offers. The consequence of these digitalisation activities in most, but not all, companies is also a range of personal measures, the vast majority of which are in the continuing training sector. In the view of JOBSTARTER plus experts, there is normally a time lag involved before digitalisation impacts on issues relating to the design of company-based training. In those areas where digitalisation has advanced, it has become established in most cases within training and is addressed in a structured way. This applies in particular to major enterprises and larger scale medium-sized enterprises, and sometimes also to small businesses. Some of these even assume the status of pioneers with regard to digitalised company processes. However, in the vast majority of businesses, discussion has only just begun regarding how company-based training can be adapted to digitalisation. The reasons for this in smaller businesses in particular often include a lack of time, insufficient personnel resources and a lack of technical infrastructure (e.g. broadband connection). In some cases strategic reorientation is often postponed due to full order books. Despite this, feedback shows that companies are certainly anticipating changed training requirements for employees and are assuming that forms of self-directed and digital supported learning will increasingly become essential.

Impact of digitalisation on initial and continuing vocational education and training

The consequences for initial and continuing VET can be considered from two perspectives. From a content perspective, the question arises as to how requirements are changing as a result of the digital transformation in vocational areas of activity and which competence profiles will be necessary in future. From a methodological and didactic perspective, it is interesting to consider how learning processes might be enriched using digital media in order to ex-

Data base – Feedback from JOBSTARTER projects

The article from the JOBSTARTER programme office is based on expert assessments of 34 projects which reflect the views of approximately 1,700 businesses. These are based, for example, on company surveys and assessment of needs of SMEs which were conducted by the projects at the start in the regions as part of the current funding round “Initial and continuing VET in Economy 4.0”.

tend the information and media competency of learners or to improve the learning process (cf. GERHOLZ/DORMANN 2017).

According to the findings of JOBSTARTER experts, it will be easier in SMEs to implement changes relating to content than methods because SMEs are commercially driven – for instance if new technologies need to be used.

SMEs find it more difficult to implement innovation in the organisation of teaching and learning or to apply new methods and media. It is certainly the case that new forms of learning are being considered to enable new content and qualifications for Economy 4.0 to be delivered more quickly and in a more targeted manner to learners. However, there is still too little evidence of implementation.

Larger companies and companies which are actively addressing digitalisation are increasingly developing individualised digital solutions for their trainees. In this case, for example, trainees control practice facilities using a tablet and at the same time use it to obtain information and to learn independently. Similarly, project-based work using digital media is gaining in significance in training. Training personnel are also creating digital learning materials themselves for trainees (e.g. so-called “learning nuggets”, i.e. small learning units for micro learning) which are tailored to the individual qualification requirements of the company. They are therefore not only communicators of specialist knowledge and skills, but also authors and learning process mentors. As a result of the more intensive exchange between trainer and trainee, new possibilities are opening up for controlling the learning process, coaching learners and in particular when using learning management systems. Informal learning can also be encouraged in this way.

Change to the everyday training routine

In most cases, it is in smaller businesses in particular where virtually no changes to the everyday training routine are identifiable. With regards to self-directed learning, the use of digital media and learning using mobile end devices, a change of the learning culture is only apparent in individual cases. In some instances, security regulations present an obstacle to this in businesses (data protection), however in some cases trainers are also unwilling to use media which trainees are more skilled in using than they are themselves. There are also cases in which training personnel show an interest in innovation, however the company does not invest in the necessary infrastructure. Examples of the opposite are reported as well. In these cases appropriate hardware or software is purchased but not used because training personnel lack the necessary conceptual understanding as to how, for instance, tablets are to be integrated in terms of methodology and didactics in the everyday training.

In the view of JOBSTARTER plus experts, forms of learning should be prioritised which involve learners more actively and enable varied support with a focus on competency. Project managers recommend in particular initiating shared learning involving the trainees together with training personnel. For both parties, this includes approaching their own “lack of digital understanding” with confidence.

Support requirements for trainers

Feedback from trainers indicates very varied further training requirements. This extends from very basic to specific issues, e.g.:

- General IT competencies and competencies when dealing with a range of digital devices, with virtual reality glasses or similar
- Use of specific software
- Ideas for how to approach future trainees in a modern way, digital marketing of training
- Designing communication using apps, clouds, wikis and blogs
- Use of digital training evidence booklets, integration of hand-held devices
- Knowledge of data protection, data security and IT security for trainers and trainees
- Didactic concepts for creating innovative learning arrangements involving learning platforms, summary of good practice examples
- The basics when creating digital learning materials and the use of authoring systems
- Coaching and learning support, changing role of trainers.

However, two problems in particular often prevent these requirements from being addressed more seriously.

On the one hand, from the company perspective the main key issue currently is searching for suitable and motivated applicants for company training positions – as according to feedback from all projects, regardless of which industry and in which region. The low number of applicants, applicants’ limited capacity for training – in the view of the companies – and the dropout rate are currently posing significantly greater problems for many companies than the question of how digitalisation might influence training. On the other hand, the second key issue cited is that training personnel generally lack the time for individual continuing training. First many feel that their current issues leave them no time for anything else. Operating the business day-to-day leaves too little time to get involved with digital content. In most cases, the preparation needed for training purposes cannot be achieved. Second all too often, responsibility for this is delegated solely to the trainers, instead of involving this theme in strategic considerations relating to personal

Figure

Areas of activity relating to the support of the company and of training personnel



and organisational development. The consequence of this is that while the majority of trainers certainly recognise the necessity for changes in VET in terms of didactics and methods, implementation only occurs in isolated instances.

Solutions

The requirement assessments conducted by the JOBSTARTER plus projects indicate a need for support in four areas in particular (cf. Figure).

In addition to the broad-based further training requirement for trainers, companies require in particular advice on change management and on the design of organisational development processes. Transferring traditional forms of teaching and learning into a digital setting is not sufficient, instead an awareness of a change in a learning culture must be created; a learning culture in which all participants learn together. It also requires the development of a digitalisation strategy which incorporates viable concepts for initial and continuing VET and the procurement of the necessary infrastructure and hardware. Here, it must be borne in mind that individual persons in the company will always be heavily involved in driving these developments. Levels of interest at decision-maker level are critical to this in particular. JOBSTARTER plus projects report that if, for example, the managing director supports the issue, then the trainers are likely to be far more open to also exploiting the opportunities of digitalisation for training. In order to embed digitalisation as a firm component of training and to be able to use appropriate resources for the digital transformation process the support of individuals in positions of responsibility must be obtained. In this respect, support always also involves a lot of persuading.

In order to succeed at this, a range of different methods are used. Trainees are deployed as ambassadors for digitalisation, trainers receive specific advice, mentoring programs are introduced, the transfer of knowledge between young and old and “creative rooms” are established, company management is made aware, leading businesses are presented as practical examples, networking and exchange with other companies is intensified. “Economy 4.0 is definitely not a change process which can be implemented with a scattergun approach”, is how one project summarises what is needed. Solutions must be found which are tailored entirely to the company concerned. ◀

*(Translation from the German original in BWP 3/2018:
M. Lee, GlobalSprachTeam, Berlin)*

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Vocational education and training – a stepping stone to successful career pathways



HUBERT ERTL

Prof. Dr., Director of Research and
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This part looks at transitions at the so-called “second threshold”, i.e. transitions from initial training to working life. This threshold is certainly a valid object of debate in itself. VET research into the consequences of digitalisation has shown that change processes are gaining in momentum and that new requirements are constantly bringing about realignments in people’s working lives. The articles included here also take account of this development.

Initial and continuing VET can create a dynamic world of work

The low current rate of youth unemployment in Germany is frequently interpreted as a sign of successful transitions at the second threshold. Nevertheless, closer consideration of the figures reveals that entry to the labour market is often precarious. Fixed-term contracts of employment are sometimes the norm, and it can be difficult to secure an adequate income. Initial and continuing VET is shown to be a good route for reducing the risk of long-term precarious employment.

Seen in a wider context, dual training forms part of an array of provision which is becoming ever more differentiated and also encompasses academic education programmes. We need to remember, however, that systematic integration into company life is a particularly promising characteristic in terms of delivering successful training. Practice-related training provides targeted preparation for skilled employment in the German labour market and also enables workers to switch to related or completely different occupations.

Conducting systematic research into training pathways and decision-making patterns

In order to strengthen the potential offered by vocational education and training, especially in times when dynamic changes are occurring on the labour market, we have to focus on expanding findings which relate to vocational orientation and career choice processes and to company decision-making patterns.

BIBB is also pursuing this objective by realigning its strategic research planning into thematic clusters. Three of these clusters are firmly dedicated to investigating future VET re-

quirements in order to provide people with a compass that will lead to success and fulfilment in a world of work undergoing change.

The cluster “Vocational orientation and transitions – integration into training and work” is, for example, investigating the issue of how VET can continue to help create stable and secure routes into and within working life and facilitate societal participation. The “Digital transformations – the future of vocational training and work” cluster is studying the impacts of digitalisation on a labour market that has its basis in vocationalism and is seeking to identify the requirements for sustainable VET in a systematic way. The cluster “Company decision making and action – factors influencing company training and recruitment” is correlating various theoretical approaches in order to provide a better explanation of company decision-making behaviour and to assess the consequences for training patterns.

In conducting this research work arranged in clusters, BIBB is making an important contribution towards ensuring that vocational education and training in Germany can continue in future to operate on a solid basis which has its foundations in sound academic research. ◀

(Translation from the German original in BWP 2/2019:

M. Kelsey, GlobalSprachTeam, Berlin)

Structuring and standardisation of vocational orientation

Evaluation-based design of a central action area for vocational education and training



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Using the example of the BMBF programme “Supporting vocational orientation in inter-company vocational training centres and comparable VET centres” (BOP), this article explores the question of what a funding programme can contribute to the development of a central action area for VET, and the importance of a supporting evaluation in this context.

The key data of the programme and evaluation are outlined in the introduction, and the article concludes with the presentation of the most significant outcomes of the evaluation and the consequences of these for the shaping of vocational orientation.

The action area of vocational orientation

Career choice decisions made by young people are governed by complex interdependent factors that influence one another. Alongside the interests and abilities of the individual, important roles are played by aspects such as the current respective situation on the labour and training market, reactions from within the social environment and the structuring of vocational orientation provision (cf. BIBB 2018, p. 448). At the same time, career choice decisions are (no longer) a one-off event. They usually need to be scrutinised and adjusted on several occasions over a lifetime. The objective of vocational orientation is, therefore, to foster young people’s career choice competence. To this end, it is important that due consideration is accorded to the various influencing factors in orientation and decision making processes. Inclusion of practical or business-related provision in school-based vocational orientation has in particular now become part of the quality standard (cf. e.g. BRÜGGEMANN 2015).

The programme “Supporting vocational orientation in inter-company vocational training centres and comparable VET centres” (“BOP”), which was instigated by the Bundesministerium für Bildung und Forschung (BMBF) [Federal Ministry of Education and Research], has taken on a structure-defining role as a beacon in the development of an action area for vocational orientation (cf. RATSCHINSKI et al. 2017, p. 120). This will be explained below.

Key data of BOP and of the supporting evaluation research

The BOP was initially introduced as a pilot project in 2008 before being established on a firm footing in 2010, earlier than planned. The programme provides for a two-day analysis of potential for school children, which takes place in Year 7 or Year 8. It also includes so-called “workshop days”, i.e. a period of two weeks in Year 8 during which pupils explore at least three occupational fields (out of a possible total of 18). The core objective of BOP is to strengthen pupils’ career choice competence and thus support them in arriving at well-considered and self-determined options. The evaluation results from the pilot phase of the BOP indicated a good level of acceptance of the programme by all stakeholders involved. They also enabled the conclusion to be drawn that the practical occupational field explorations were a useful supplement to the vocational orientation provision that had previously existed. However, the initial evaluation failed to provide a response to a number of questions of policy and technical relevance. For this reason, BIBB commissioned further and much more extensive evaluation research in 2012 with the particular aim of investigating the impacts exerted by BOP on the career choice competence and learning motivation of the pupils. This assignment was carried out between the start of 2013 and the end of 2017 by an investigation team comprising InterVal GmbH, the University of Hanover and qualiNETZ GmbH. Technical support was provided by the Vocational Orientation Programme Office at BIBB (cf. Information Box, p. 28).

Even while the evaluation was still ongoing, the Vocational Orientation Programme Office made use of the findings which emerged by passing on work materials to the vocational training centres conducting the programme via vehicles such as workshops. These became an object of debates centring on changes to guidelines and also informed discussions between the Federal Government and federal states as part of activities undertaken within the Educational Chains Initiative¹. After the conclusion of the evaluation, the results are continuing to play an important role in the structuring of the BOP and in consultations between the Federal Government and federal states regarding the design of other programmes and further vocational orientation measures. The most significant results will be presented below together with example explanations of how these outcomes have contributed to the shaping of the action area or may do so in future.

The BOP as a structure-defining beacon programme

The evaluation confirms that the functional chain contained within the programme (analysis of potential – workshop days – company-based work experience for pupils – career choice decision, see Figure 1) has helped provide a structure to the vocational orientation process right across the country (cf. RATSCHINSKI et al. 2017, pp. 119 ff.). Programme interventions act as part of this functional chain to exert a positive influence on career choice competence

and therefore also on the career choice decisions of most of the young people.

One of the fundamental ideas underlying the BOP was to create a “time-forward displacement of vocational orientation by closely linking school teaching and practical experience” (INBAS/IWAK 2010, p. 18) in order to reduce the number of young people without any prospect of a training place and have fewer persons in the so-called transitional sector. Although there had certainly been various federal state initiatives which had previously acted as prototypes for the BOP, the analysis of potential, the workshop days or comparable instruments did not become established as a fixed component of vocational orientation in almost all states until the BOP had been disseminated nationally and agreements had been put in place between the Federal Government, the federal states and the Federal Employment Agency within the scope of the Educational Chains initiative. Since 2012, a constant average of more than 160,000 school pupils per year have been financed using BOP funding. By way of comparison, the corresponding figures for 2010 and 2009 were around 100,000 and just over 42,000 respectively.

Agreements between the Federal Government, the federal states and the Bundesagentur für Arbeit (BA) [Federal Employment Agency] have now been concluded with 13 federal states. Analyses of potential or comparable competence assessment procedures form a constituent part of all agreements. In twelve federal states, endeavours are being undertaken to establish blanket coverage for all forms of school, in some cases including upper secondary schools. Comprehensive introduction for all school types took place in North-Rhine Westphalia with effect from the 2016/2017 school year. Workshop days or occupational field explorations have been incorporated into eleven agreements.²

In order for vocational orientation to succeed, it is of crucial importance for schools to be closely involved since the law stipulates that they bear overall responsibility in this area. The programme has helped to ensure that vocational orientation takes place at an early stage, from Year 7, whilst the Federal Government-federal states-BA agreements are increasingly allowing the programme to be introduced at all forms of school. The BOP instruments are creating opportunities for timely consideration of issues relating to

Research design of the evaluation

Evaluation research for the BOP programme encompassed the following investigation modules.

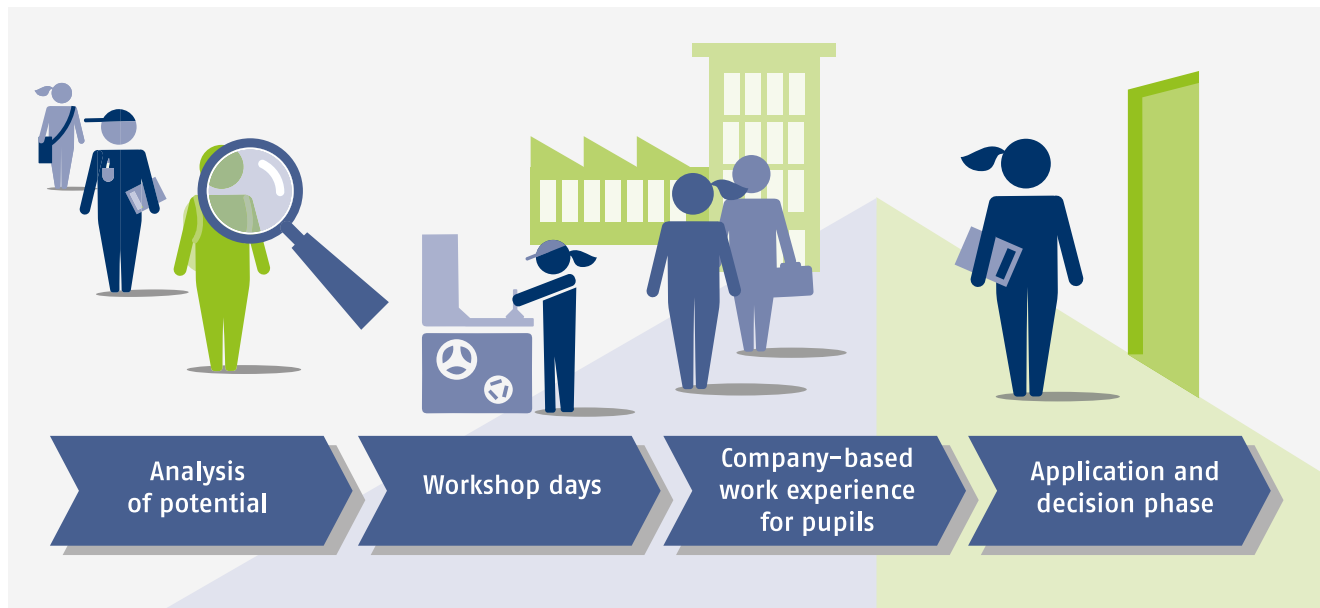
1. Process data analysis from the BOP application portal (applications from two rounds, interim evidence on a one-off basis)
2. Observations of the implementation of analyses of potential and workshop days (8 locations)
3. Qualitative interviews with pupils at the participating locations with a control group (4 occasions, as of the time of the last survey n = 174)
4. One-off qualitative surveys of education and training providers, network partners, teaching staff and parents at the locations involved
5. Annual written provider questionnaires on various main topic focuses (full survey of around 400 participating vocational training centres per year)
6. Written surveys of schools on the implementation of the BOP and vocational orientation (n = 257)
7. Quantitative longitudinal survey of pupils with a control group (3 occasions, as of the time of the last survey n = 1,408)
8. One-off cross-sectional survey of classes of school leavers with a control group (n = 2,179)

¹ The Educational Chains Initiative represents a joint commitment on the part of the BMBF, the Federal Ministry of Labour and Social Affairs and the BA to join forces with the federal states in order to dovetail successful funding instruments and create a holistic, nationally valid and coherent support system for vocational orientation and the transitional sector. For this purpose, the Federal Government, the federal states and the BA conclude state-specific agreements relating to the transition from school to work.

² All agreements between the Federal Government, the federal states and the BA may be viewed at www.bildungsketten.de/de/388.php (retrieved: 30.07.2018).

Figure 1

Functional chain of vocational orientation



vocational orientation by school pupils, by teachers and by parents and guardians. At the same time, they are structuring the activities undertaken by the pupils and the support services provided by schools and external partners.

Schools and vocational centres normally work together over a period of several years. In more than half of cases, this leads to the development of ideas for joint projects which extend beyond cooperation within the BOP programme (cf. RATSCHINSKI et al. 2017, p. 54).

The influence exerted by the BOP on the development of a national vocational orientation system has, however, not merely been limited to a structural impact. The relevant instruments at federal state level are usually also aligned to the quality and implementation standards of the BOP. The agreements between the Federal Government, the federal states and the BA make specific reference to the quality standards set by the BMBF for the carrying out of analyses of potential.

The BOP was thus accorded the status of a beacon programme on the basis of the outcomes of the evaluation. However, the results also show that there is even greater scope for enhancement of the career choice competence of young people if qualitative further development of the programme takes place. Two examples of how it was possible to demonstrate that a particularly strong influence was exerted on career choice competence are presented below.

Shaping communication – the significance of preparatory and reflective discussions

Within the scope of the five-year evaluation, the quality and extent of communication with pupils during preparation, implementation and assessment of the BOP instruments emerged as significant success factors at a very early stage. Carrying out an analysis of potential as soon as in Year 7, for example, was shown only to be useful in circumstances where the school had introduced and addressed the topic beforehand. The aims of the analysis of potential and of individual assignments also need to be explained in comprehensible terms to the young people taking part. In the case of the observation of the implementation of analyses of potential at eight BOP locations, however, it was revealed that some pupils had no precise idea of the purpose of the process, did not know which competencies were being monitored in the exercises and were unaware of the significance of these for their vocational orientation (cf. RATSCHINSKI et al. 2017, p. 32). Nevertheless, the quality of feedback interviews is the main crucial factor. The qualitative interviews with the young people signalled that they often perceive feedback from the analysis of potential to be one-sided and a “recommendation on the part of the member of staff carrying out the observation” (ibid., p. 56). Self-reflection which stimulates learning processes, however, requires prior understanding of the roles of self-assessment and external evaluation. Participants also need to be able to process their own experiences and arrive at their own conclusions. For this reason, the evaluation

New support services for the BOP – two examples

1. Seminar provision

A two-day seminar on the topic of "Feedback and reflection in the BOP" was designed in 2017. This workshop is aimed at educational professionals who conduct reflective discussions with the young people. Its aims are to raise awareness of the particular relevance of this element, to impart the necessary pedagogical attitudes, and to expand methodological competences for the structuring of feedback and reflection. The seminar has already been hosted four times. The concept is currently undergoing revision, and contents for a support brochure are being prepared. The intention is for this workshop to become part of standard training provision for educational professionals involved with the BOP. Federal state-specific adaptations are also being planned.

2. Video diaries

Use of video diaries during the workshop days was initially introduced on a pilot basis in the summer of 2017. The idea is that daily entries to a video diary will support young people in discovering the strengths and interests they have and in identifying which occupational activities could suit them. In addition, the video diary serves as a basis for the reflective discussion that takes place following the workshop days. Because of positive experiences at the pilot location, various audiovisual and explanatory materials have been developed for both educational professionals and pupils. These will also make it possible for BOP providers to deliver the project independently in future (i.e. without media education support).

team recommends, for example, that the analysis of potential should end with an outcome which pupils have developed for themselves. This would also make it easier for the young people to use such a result as a point of reference for later decisions made in the career choice process (cf. *ibid.*, p. 123).

A particularly important role is also played by process-support communication at the interfaces to the school and the family. These interfaces are only capable of being influenced to a very limited extent by the programme itself because of the large number of stakeholders. Nevertheless, the vocational training centres were encouraged both to pass on information and to provide assistance on how teachers and parents can integrate this data into their own respective context in an individual and efficient way. For this reason, the support provided by the Vocational Orientation Programme Office at BIBB has been ascribing increasing significance to the related topics of "communication, feedback and reflection" cf. the sample activities listed in the Information Box).

Reaching more target groups – internal differentiation and diversity of provision

Participation in the programme is not in itself sufficient to guarantee that the measure will actually achieve its objectives. Effects depend on how pupils accept provision at an individual level (cf. RATSCHINSKI et al. 2017, pp. 54 ff.).

There are numerous possible approaches for further development of the programme.

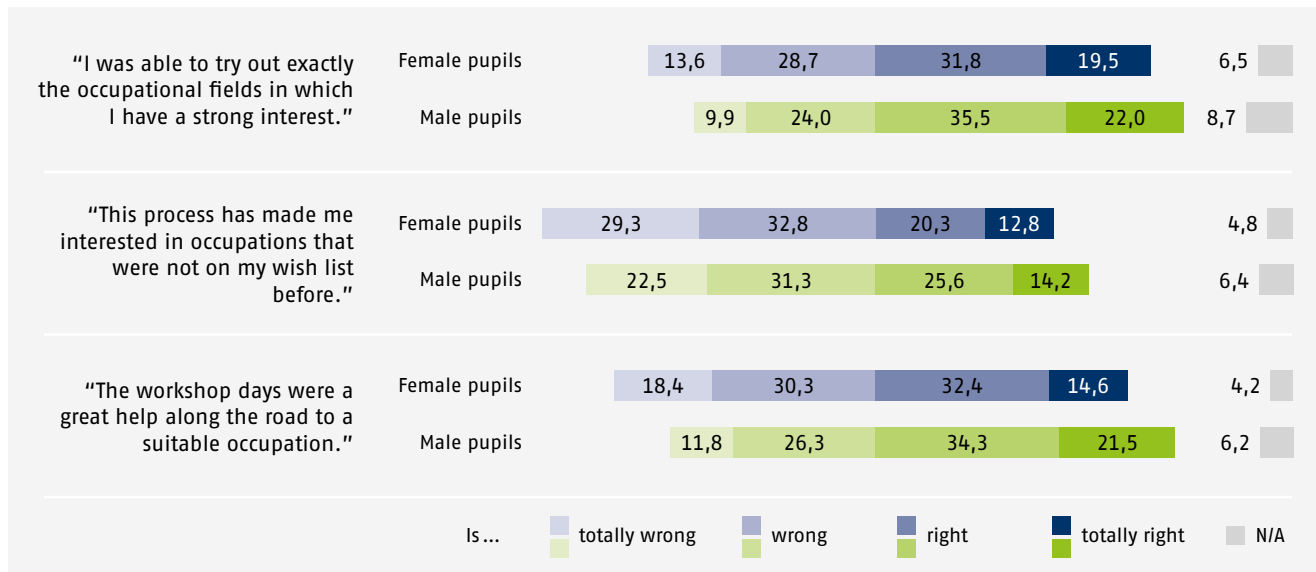
The spectrum of occupational fields offered may in itself be decisive for whether the service is viewed as being appropriate or not. Girls, for example, are less likely to find the BOP provision appealing (cf. Figure 2). Boys benefit the most, particularly those who already know that they wish to enter training upon completion of schooling. If the programme is to live up to its objective of serving all school pupils equally, then this is an area in which development is still required.

Career choice continues frequently to take place in a gender-specific way (cf. e.g. BMBF 2018, pp. 40 ff.). Pupils are in particular need of support if they wish to explore occupational fields which are not typical of their gender. In many cases, vocational training centres hosting the workshop days allocate one of the occupational fields in a gender non-typical way in the hope that young people's enthusiasm may be fired once they have had the chance to familiarise themselves with it. However, observations conducted as part of the evaluation revealed an opposite effect in the form of significant motivational problems in these groups. The evaluation team therefore recommends that the task assignments in the analysis of potential should be used as an initial vehicle to raise awareness for strengths that are gender non-typical.

However, the greatest potential for further development of the programme in line with requirements is to be found in the structuring of the measure itself. This makes it even more important to also appeal to young people who may be aspiring to achieve a university of applied sciences/general higher education entrance qualification after completion of lower secondary school rather than wishing to proceed to training (yet). One way of resolving this, for example, would be for the occupational fields covered during the workshop days also to address school-based training programmes and professions for which a higher education qualification is required alongside the dual training occupations. The general conditions of the programme could also be altered for schools which offer upper secondary level education.

In this context, another result of the evaluation is of interest. Diversity of assignments and different individually matching degrees of difficulty of tasks are also revealed to exert a positive influence on the effect of the BOP programme. The more strongly in agreement the young people are with the statement "The difficulty of the tasks was exactly right for me", the greater will be the development in partial dimensions of career choice competence (cf. BIBB 2018, p. 434). Deployment of state-of-the-art technology and the closest possible proximity to operational practice help to increase interest on the part of the pupils. Overlaps in tasks between the analysis of potential and exercises covered in the sub-

Figure 2
Gender-specific evaluation of the BOP



Differences between female pupils and male pupils significant at the level +0.05 or ++0.01 (t-test) Information in percent

Source: BIBB 2018, p. 432, Survey of pupils as part of the BOP evaluation (2015, intervention group only), n = 1,056

jects of business studies and technology should be avoided so that pupils perceive that participation in the BOP will provide added value.

Just how such an individualisation of assignments can be realised within the scope of a highly standardised programme represents a challenge which the Vocational Orientation Programme Office is already tackling together with the BOP providers.

Conclusions and outlook

The evaluation of the BOP confirms that it is exerting an effect as a "beacon programme" and shows that a nationally structured support scheme within a particular action area, in this case vocational orientation, can succeed in initiating medium and long-term structural changes at federal state and local government level.

The evaluation also highlights the particular challenge that is inherent in the high degree of standardisation which the implementation of a funding programme of this magnitude inevitably brings in its wake. Although the standardisation of the BOP guarantees high recognition and comparability of the instruments in terms of content, this being an important prerequisite for its structure-defining function, standard elements can induce "uniform" implementation and thus reduce the intended effect of the measure, at least at an individual level. This is particularly revealed with regard to the requirements level of tasks and gender-sensitive design of vocational orientation.

Strengthening of the communicative elements and an internal differentiation of assignments are two major recommendations from the evaluation with regard to how the individualisation and therefore also the effectiveness of the programme can be strengthened. These and further recommendations will enable the evaluation to make an important contribution to further development of the BOP. Because of its beacon function, the programme will also provide significant impetuses for quality development within the action area of vocational orientation in overall terms. ◀

(Translation from the German original in BWP 5/2018: M. Kelsey, GlobalSprachTeam, Berlin)

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Upper secondary certificate, and then what?

Factors which induce upper secondary school leavers to enter vocational education and training



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In light of the rising numbers of students, this article investigates the question of which pupils are planning to commence a programme of VET despite being in possession of a higher education entrance qualification. Data from the German National Educational Panel Study (NEPS) is used to identify factors which encourage pupils in their twelfth school year to adopt such a plan. The findings show that influences from within the social environment, the vocational orientation process and evaluations of costs, benefits and opportunities undertaken by the young people are all of relevance. These results finally serve as a basis for the derivation of proposals for vocational orientation.

Factors influencing the decision to enter training

The proportion of an age cohort acquiring a higher education entrance qualification has risen significantly over recent years (cf. BIBB 2018). For many of these young people, this means that they are predestined to move on to an institute of higher education. Nevertheless, some upper secondary school leavers with a higher education entrance qualification opt for VET, so that the proportion of such persons within the VET system has now (as of 2016) increased to almost 29 per cent (cf. *ibid.*).

This article forms part of the BIBB research project "Vocational orientations and decisions of young people in the context of competing educational opportunities".¹ Against this background, it looks at contributing factors which lead upper secondary school leavers to consider a programme of VET in the first place. Expectancy-value models provide a theoretical framework for educational decisions within this context (cf. e.g. ECCLES 2011). The underlying idea is that an educational option is preferred if it has a high subjective value and thus a high degree of perceived utility for the person and if the person also expects that he or she will be able to implement this option successfully. The following influencing factors are relevant to the assessment of the subjective value and expectancy of success.

- *Personal* factors such as interests, values, expectations and a person's notions regarding themselves and their own abilities (cf. HIRSCHI 2013).

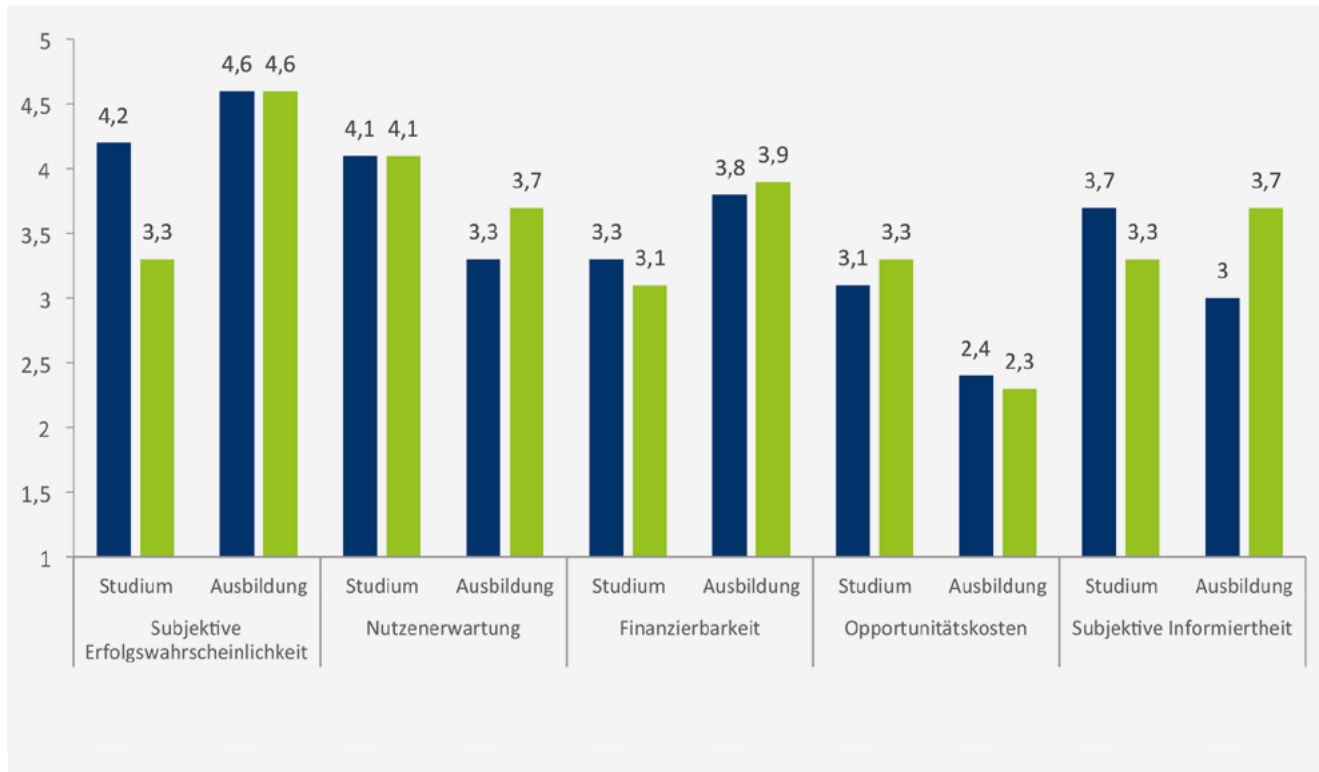
- *Social* factors including milieu-specific modes of behaviour in the environment a person is socialised in (in the form of family and friends) (cf. BOURDIEU 1998) and the striving for intergenerational status retention (cf. BOUDON 1974) – MISCHLER/ULRICH (2018) could show that the likelihood of young people considering training in the craft trades is inversely proportional to the expectation of their parents that they will enter higher education.
- *Institutional* factors, firstly in the form of the training market situation or access restrictions to programmes of study, and secondly in the shape of the vocational orientation process in which ideas are developed regarding the contents and achievability of the educational options aspired to and in respect of cost and benefit expectations associated with these options (cf. BRÄNDLE/GRUNDMANN 2013).

Database

The empirical analyses used NEPS data (cf. Information Box). The underlying sample consists of 2,500 upper secondary school pupils in their twelfth school year who provided unambiguous information on their educational plans in the first half of the academic year. At the time of the survey, it was the rule in most federal states for the upper secondary school-leaving certificate to be sat at the end of the twelfth school year. In order to prevent possible distortions caused by differing degrees of progress towards identity formation and decision-making maturity, the sample was limited to pupils who would take their upper

¹ cf. www.bibb.de/de/8475.php (retrieved: 07.12.2018)

Figure
Cost, benefit and success expectations by educational plan



Source: LIfBi, NEPS, Starting Cohort 4, doi:10.5157/NEPS:SC4:9.1.0, independent calculations from the BIBB research project "Vocational orientations"

secondary school-leaving certificate after twelve years of schooling. 55 per cent of participants are female, and 20 per cent have a migrant background. The majority of the pupils is aged between 17 and 18. Of the 2,500 young people surveyed, 16 per cent state commencement of training in the VET system to be a realistic plan for their post-school educational pathway and 84 per

cent believe that they will embark upon a programme of higher education study (irrespective of any gap phases that may be intended such as a voluntary year or period spent abroad). With regard to the socio-demographic characteristics of both groups, it is revealed that women are slightly underrepresented in the group planning to go into VET, but slightly overrepresented amongst those aspiring to higher education study. It is, however, a difference of just under three percentage points. A greater difference is shown in respect of migrant background. Whereas slightly more than 21 per cent of those seeking to enter higher education study have a migrant background, the corresponding figure for persons planning to commence training is 16 per cent.

National Educational Panel Study (NEPS)

This work uses data from the National Educational Panel Study (NEPS): Starting Cohort Grade 9, doi:10.5157/NEPS:SC4:9.1.0. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Bundesministerium für Bildung und Forschung (BMBF) [Federal Ministry of Education and Research]. As of 2014, NEPS is carried out by the Leibniz Institute for Educational Trajectories (LifBi) at the University of Bamberg in cooperation with a nationwide network. It maps longitudinal data on educational and training achievements, educational processes, and competence development in formal, non-formal and informal contexts over the entire life course (cf. www.lifbi.de and BLOSSFELD/ROßBACH/VON MAURICE 2011).

This article focuses on the seventh survey wave of starting cohort 4 (winter 2013/14), although a few variables from previous survey waves are also used in some analyses. In wave 7, participants still in the general schooling system were in their twelfth school year.

Differing evaluations of costs and benefits of the educational pathways

The investigation began by determining potential factors influencing appraisal of the two education options. T-tests enable differences to be identified between the group planning to enter training and the group wishing to proceed to higher education study. Extracts from the results of these bivariate comparisons are presented below. The Figure shows the respective assessment of each group with regard

to the options of higher education study and training on a five-point scale. Higher values denote a stronger degree of agreement with the particular statement.

In general terms, it is noticeable that respondents mostly evaluate the educational option to which they themselves aspire more positively than the respective comparison group. Those seeking to enter higher education feel that they are better *informed* about access chances and possible restrictions to programmes of study than persons wishing to enter training, whereas the latter believe that they are more knowledgeable than the former in respect of training opportunities. Anyhow, the educational option aspired to is not always necessarily assessed more positively than the alternative. Those wishing to progress to higher education and persons seeking to commence training both think that training is more *financially feasible*. The same applies to assumed *opportunity costs* (i.e. losses in income that can be expected during training/higher education study). Both groups reckon that these are significantly higher in the case of higher education, even though an “evaluation advantage” still shows for the respondents’ own educational plan. However, when asked to consider their subjective *success probability*, those interested in pursuing higher education study and training only draw a distinction with regard to the higher education option. Young people planning to commence training rate their prospects of success in a course of study (e.g. a degree) as being significantly lower, yet both groups are highly confident that they would be able to complete training successfully. The reverse picture emerged with regard to *benefit expectation*. In this case, a mean value was formed for various benefit aspects with regard to job prospects following completion of a programme of higher education study or of training (income, prestige, interesting occupation, risk of unemployment). Both groups perceive the same expected benefit in respect of higher education study. In contrast, while those interested in entering training ascribe a slightly lower level of expected benefit to their chosen pathway, persons wishing to enter higher education perceive that the benefit of the training pathway is significantly lower.

Further differences between the groups emerged with regard to

- *the vocational orientation process* (significantly more specific notions of occupational objectives and implementation opportunities and earlier entry into the vocational orientation process on the part of persons aspiring to commence training),
- *occupational interests* (higher degree of affinity with practical and technical tasks shown by young people planning to go down the training route, more interest in intellectual research and in art and language displayed by potential higher education candidates) and

- *the social environment* (in each case a higher proportion within the respective circle of friends of persons with educational aspirations identical to those of the respondent). Although sources of information on the two educational options were available to both groups, those seeking to enter higher education study were significantly more likely to seek the advice of their parents regarding higher education. This group also contains a larger proportion of persons with at least one graduate parent and also has a bigger share of respondents whose parents – according to the pupils – perceive a course of higher education study as being the educational pathway of choice for their child. Conversely, very few young people expecting to enter higher education believe that their parents aspire for them to commence training.

Who is planning dual VET?

The subsequent stage of the study involved carrying out a hierarchical logistic regression of 1,287 complete cases² in order to investigate the interplay between personal, social and institutional factors and potential mediating processes in the decision of whether to opt for training or higher education. Only variables which exhibit significant differences in the bivariate comparison are entered into the analysis. The logistic regression shows the influences of predictors on the likelihood of planning training rather than higher education study (cf. Table).

The socio-demographic variables do not exercise any significant effect on the likelihood of planning training. In contrast, the variables from the field of personality included in the second block all show an effect. Likelihood of entering training is lower if conscientiousness and openness are higher, but rises if there is a strong degree of interest in practical and technical tasks. These effects, however, disappear (Block 3 ff.) when further characteristics are entered, supposedly, because their influence is mediated by these characteristics such as school performance. Both good marks and higher self-assessed success probability with regard to higher education study reduce the likelihood of entering training. Perceived prospects of success for a programme of higher education study thus do not appear to be exclusively derived from current school performance.

Potential influences of the social environment were then included in the analysis. Despite the differences with re-

² The reduced sample size compared to the initial sample is the result of missing values on individual variables. One of the reasons for this is the use of several survey waves for the analysis. The ratio stated above of persons wishing to enter training and persons aspiring to proceed to higher education study is, however, retained in the test sample. Sporadic differences between complete and incomplete cases in the variables used in the regression, such as with regard to the existence of a migrant background, are not statistically meaningful.

Table
Likelihood of planning commencement of training

Predictors	1 Exp(B)	2 Exp(B)	3 Exp(B)	4 Exp(B)	5 Exp(B)	6 Exp(B)
Female	.79	1.03	1.08	1.00	.94	.72
Migrant background exists	.76	.77	.68	.73	.90	1.03
Age	1.13	1.15	.95	.95	.90	.98
Conscientiousness		.81*	.99	.98	.98	.95
Openness to new experiences		.84*	.87	.90	.88	.96
Self-esteem		.97**	1.04*	1.03'	1.01	.99
Practical and technical interests		1.33**	1.35**	1.35**	1.25'	1.13
Self-concept of school performance			.93	.94	.95	.72
Average mark			.73***	.76***	.76***	.81**
Subjective success probability: completion of higher education study			.24***	.30***	.26***	.25***
Proportion of friends aiming to enter training				1.14'	1.13'	1.10
At least 1 graduate parent				.98	.90	.88
Occupational status attainable via training -> mother				1.48**	1.29*	1.31*
Occupational status attainable via training -> father				1.24*	1.10	1.11
Parents: child should enter training				7.84***	7.15***	4.39***
Benefit expectation of training					4.41***	3.65***
Financial feasibility of higher education study					.95	1.03
Opportunity costs of training					.83	.84
Subjective knowledgeability course of study						.41***
Subjective knowledgeability training						2.32***
Information seeking on specific occupations						1.74**
Specific application goals						1.43**
Time of beginning of orientation process						1.38'
Growth in Nagelkerke's R ²	.007	.034***	.297***	.105***	.051***	.085***

***p < .001, **p < .01, *p < .05, 'p < .10; n = 1,287; Source: Leibniz Institute for Educational Trajectories (LifBi), National Educational Panel Study (NEPS), Starting Cohort 4, doi:10.5157/NEPS:SC4:9.1.0, independent calculations from the BIBB research project "Vocational orientations"

Guide: In this hierarchical logistic regression, values greater than 1 signify that this predictor increases the likelihood of planning training, whilst values lower than 1 signify that the predictor reduces such a likelihood or in this case also increases the probability of an intention to pursue higher education study, e.g. likelihood of training decreases if the young person achieves good school marks.

gard to the educational qualification of parents that occur in the bivariate comparison, this variable does not, in conjunction with those already entered, exert any additional influence on the likelihood of planning to commence training. Training likelihood only increases if young people perceive that their parents wish them to enter training. Probability of commencing training is also raised by the assessment that training will enable a young person to enter an occupation which, in terms of status level, is similar to or better than the occupations exercised by the parents.

Because both groups assess the benefit of higher education study and the costs of training similarly in the bivariate comparison and merely differ with regard to the respective other educational option, the regression only includes cost evaluation with regard to higher education study and evaluation of benefit in respect of training. Assessment regarding the financial feasibility of a programme of higher education study is shown to exert no influence on training likelihood. However, a strong conviction that training will create a high degree of benefit with regard to attractive

occupational opportunities has a significant effect on the probability of entering training. Likelihood of planning to commence training also rises if a person's notions regarding their own career prospects are more specific.

Could more specific vocational orientation increase interest in training?

One thing shown by the results of the analyses is that parental educational aspirations exert a considerable influence also in the case of young adults shortly prior to the transition to training or a course of study. As far as vocational orientation measures are concerned, this could act as an impetus to work with pupils of all age groups across all phases of education to reflect upon social influencing processes as well as on their own interests and objectives in order to make those seeking advice aware of such processes and to allow them to be considered in the decision-making procedure.

With regard to the issue as to which characteristics prove relevant in connection with a decision to opt for training, the results enable the following indications to be derived for vocational orientation at upper secondary level. Firstly, both groups ascribe a high degree of benefit expectation to a course of study (e.g. a degree). A similar view on training is, however, only embraced by those interested in pursuing this pathway. Better information on the broad range of training allowances and of labour market and income prospects after completion of training could help to enhance

the attractiveness of training as an educational option. The possible labour market and career prospects offered by upgrading training should also be indicated.

Consideration should further be accorded to expanding the occupational spectrum covered by vocational orientation measures, especially by adding occupations which include task aspects relating to intellectual research and art and language. In this regard in particular, young people have so far believed that it is only possible to fulfil such interests in the higher education sector. The group differences identified in respect of degree of specificity of vocational orientation give rise to the supposition that at least some of those aspiring to higher education are seeking to use such a programme of study to develop more concrete occupational ideas. If this group were to succeed in pursuing orientation at an earlier stage, some might also consider entering training occupations.

Imparting information relevant for the pursuit of an intention to commence training does not need to be solely left to the institutionalised vocational orientation system. Such information can also be used by companies providing training to address young people in possession of an upper secondary school-leaving certificate, in order to create awareness amongst this target group of the existing opportunities available at these companies. ◀

*(Translation from the German original in BWP 1/2019:
M. Kelsey, GlobalSprachTeam, Berlin)*

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Dual higher education study or advanced training – what increases the chances of career advancement?



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Although the number of graduates with a bachelor's degree has risen over recent years, little information is available as to which position such persons assume within a firm and especially with regard to whether they vie for company advancement with those in possession of the formally equivalent qualifications of master craftsman, technician or certified senior clerk. This article presents the results of a company survey, which uses a choice experiment to identify possible competition for appointment to project management positions between persons who have completed advanced training and bachelor's programmes graduates (dual course of study).

Equivalent, but not the same

The effects of the Bologna Reform on the German labour market have been discussed in academic research circles since the process was instigated in 1999 (cf. e.g. WÜNSCHE et al. 2011, FLAKE/ZIBROWIUS 2017). According to the German Qualification Framework (DQR), the purpose of both bachelor's degrees and advanced training programmes (such as master craftsman, technician or business management specialist) is to deliver competencies “for the planning, processing and evaluation of comprehensive technical tasks and problems”. In addition, persons holding such qualifications should be able to “assume responsibility when working within expert teams or demonstrate responsibility in leading groups or organisations”.¹

This makes it clear that employees with bachelor's degrees and advanced training may well compete with one another within the company hierarchy to secure senior skilled worker positions or junior or middle management jobs. Although more recent empirical studies (cf. FLAKE/ZIBROWIUS 2017) show that neither persons who have completed advanced training nor those with academic qualifications can be systematically adjudged to be in possession of higher competencies, both these educational pathways provide the necessary training to take on project management roles. Nevertheless, there are very few findings relating to the preferences of company decision makers when persons with these different types of qualifications compete for a job appointment. Such information is, however, of relevance to young adults who are making career choices and aspiring to company advancement.

This article presents the results of an experimental company survey conducted within the scope of the research pro-

ject “Do bachelor's degrees compete with vocational and advanced vocational qualifications? An analysis of company preferences”.² The survey simulates a company staffing process in which one of three applicants must be selected for a project management position.

The signal function of educational qualifications

From a theoretical point of view, a company staffing appointment may be interpreted as a rational choice or as a decision, which maximises benefits. Companies select applicants whose characteristics they believe will deliver the highest degree of productivity. Educational certificates serve as an important signal for this productivity (cf. SPENCE 1973). The extent to which companies are familiar with the skills and abilities which are learned and certified during a certain programme of training or study is of particular relevance within this context. The standardisation and the level of awareness enjoyed by an educational certificate may serve as a key indicator of how familiar and informed companies are. The degree to which training is practice-related can also play a part.

Advanced training programmes are governed in a nationally standardised way pursuant to § 53 of the Berufsbildungsgesetz (BBiG) [Vocational Training Act]/§ 42 of the Handwerksordnung (HwO) [Crafts and Trades Regulation Code]. This is not the case in respect of advanced training regulations promulgated in accordance with § 54

¹ Source: www.dqr.de/content_en/2336.php (retrieved: 24.01.2019)

² For more detailed information on the research project, visit www2.bibb.de/bibbtools/de/ssl/dapro.php?proj=2.1.313 (retrieved: 24.01.2019).

The Reference Company System

The Reference Company System comprises an Access Panel, i.e. a stable pool of companies, which have declared their willingness to be available for BIBB surveys. This permits rapid and reliable analyses to be conducted on current topics. Around 1,400 companies are currently surveyed once or twice a year on the latest issues affecting company-based VET. The present investigation represents the fortieth occasion on which the companies have been surveyed within the framework of the Reference Company System.

Detailed information is provided at: www.bibb.de/de/12471.php (retrieved: 24.01.2019)

BBiG/§ 42a HwO, responsibility for which has been transferred to the competent bodies. Notwithstanding this, such qualifications also have a long tradition and are widely disseminated and known about. Persons who undergo advanced training will also have acquired well-founded practical experience during the process itself.

Universities of applied sciences and institutes of higher education are largely left to their own devices when it comes to the structuring of courses. This means that the level of standardisation of these qualifications is lower. Dual courses of higher education study constitute a distinctive aspect in this context. *Training-integrated programmes of study* provide a curricular combination of nationally standardised training courses governed by the BBiG/HwO and higher education study. This makes them comparable across Germany. *Practice-integrated programmes of study*, on the other hand, merely require students to complete longer practical placements at companies. These practical phases are credited as academic achievements (cf. Wissenschaftsrat [German Council of Science and Humanities] 2013, pp. 9 ff.). The idea is that graduates of these types of programme should have experienced similar proximity to practice to that provided during the qualification route of a person pursuing advanced training.

For young adults who wish to train in a practice-related way, it is of great interest to know which of the three training pathways (VET followed by advanced training, a training-integrated bachelor's degree or a practice-integrated course of study) offer them better opportunities for career advancement.

For this reason, the company survey focuses on the signal effect of the three education and training qualifications whilst considering further applicant characteristics. We will concentrate on recruitment to a project manager position since this represents the first rung on the career ladder.

Structuring of the survey

The company survey was conducted in 2017 using the BIBB Referenz-Betriebs-System (RBS) [Reference Company System] (cf. Information Box). The questionnaire used a choice experiment to simulate the appointment of a project manager to oversee up to three persons. A choice experiment is a form of vignette experiment. It identifies the preferences of respondents by presenting them with descriptions of objects or persons (vignettes), from which they select their preferred option. The attributes of the vignettes are randomly varied according to certain characteristics. This experimental design allows a causal interpretation to be made of the effects of the characteristics on likelihood of selection (cf. AUSPURG/LIEBE 2011).

The decision makers surveyed were presented with a choice of three persons and asked to choose the candidate they believed to be best suited. Each respondent was given three variants of this decision-making situation. They were also given the option of choosing none of the stated candidates in order to avoid forced decisions (cf. *ibid.*). The Table shows one of 36 possible decision-making situations. As well as having different *types of qualification*, applicants exhibited four further varying characteristics.³ The practical part of the training programmes could have taken place

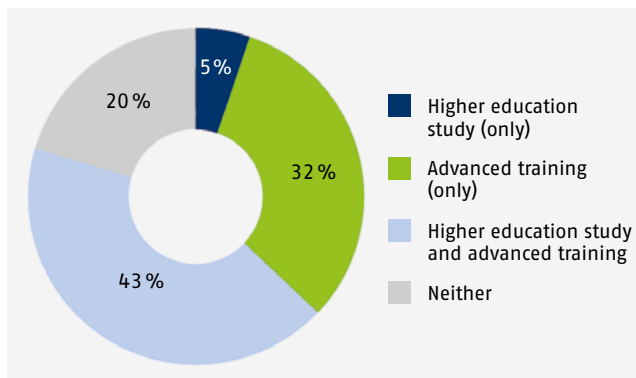
Table

Choice set from the questionnaire (example)

Which of these three people would you prefer for this position based on the characteristics listed?				
Characteristic	1	2	3	
Type of qualification	Advanced training (e.g. master crafts-man, technician)	Bachelor's degree (practice-integrated)	Advanced training (e.g. master crafts-man, technician)	None of these options
Place of training	Own company	External company	Own company	
Final mark	Satisfactory	Very good	Satisfactory	
Occupational experience after end of training	2 years in external	2 years in own	None	
Professional matching	Complete	Partial	Complete	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Source: Own representation

Figure 1
Companies by training strategy



Source: RBS 40 (2017), valid answers only, n = 270

at the person's own firm or at an external company. Final marks were stated as being *very good* and *satisfactory* because these grades are known to exert an influence on the recruitment preferences of employers (cf. HUMBURG/VAN DER VELDEN 2015). Occupational experience after the end of training is also a criterion that is relevant to staffing choices, particularly in the case of higher education graduates (cf. ENGEL 2010, HUMBURG/VAN DER VELDEN 2015). This is varied qualitatively (*none*, *2 years internally*, *2 years externally*) in order to consider lower induction costs of internal applicants. Finally, a differentiation is made in respect of professional matching (*complete/partial match*) because this is also accorded a high degree of significance (cf. ENGEL 2010, HUMBURG/VAN DER VELDEN 2015).

Training strategy of the RBS companies

Of around 1,350 RBS companies contacted, 278 companies (= 21.1%) participated in the survey. Over half (54%) of the responding companies are based in the "producing and processing industries" while around 20 per cent operate in the area of "business-related services". 38 per cent of these firms have fewer than 20 employees. 25 per cent employ between 20 and 99 individuals, and 37 per cent have more than 100 staff. Almost half of the responding companies provide training via dual higher education study themselves (cf. Figure 1). Around 75 per cent support their staff by paying costs or by allowing time off for advanced training measures. By way of contrast, a fifth of companies did not fund either of the training programmes.

³ It was decided not to vary soft skills because of their strong significance. The introductory text instead made it clear that interviews had demonstrated that all applicants were in possession of suitable social competencies. The reason for this is to place the emphasis on the formal/professional factors offered by applicants as shown in their curriculum vitae.

⁴ All candidates were rejected in five per cent of cases. These cases are excluded from the multivariate analysis.

Applicant characteristics and company training strategies are the crucial factors

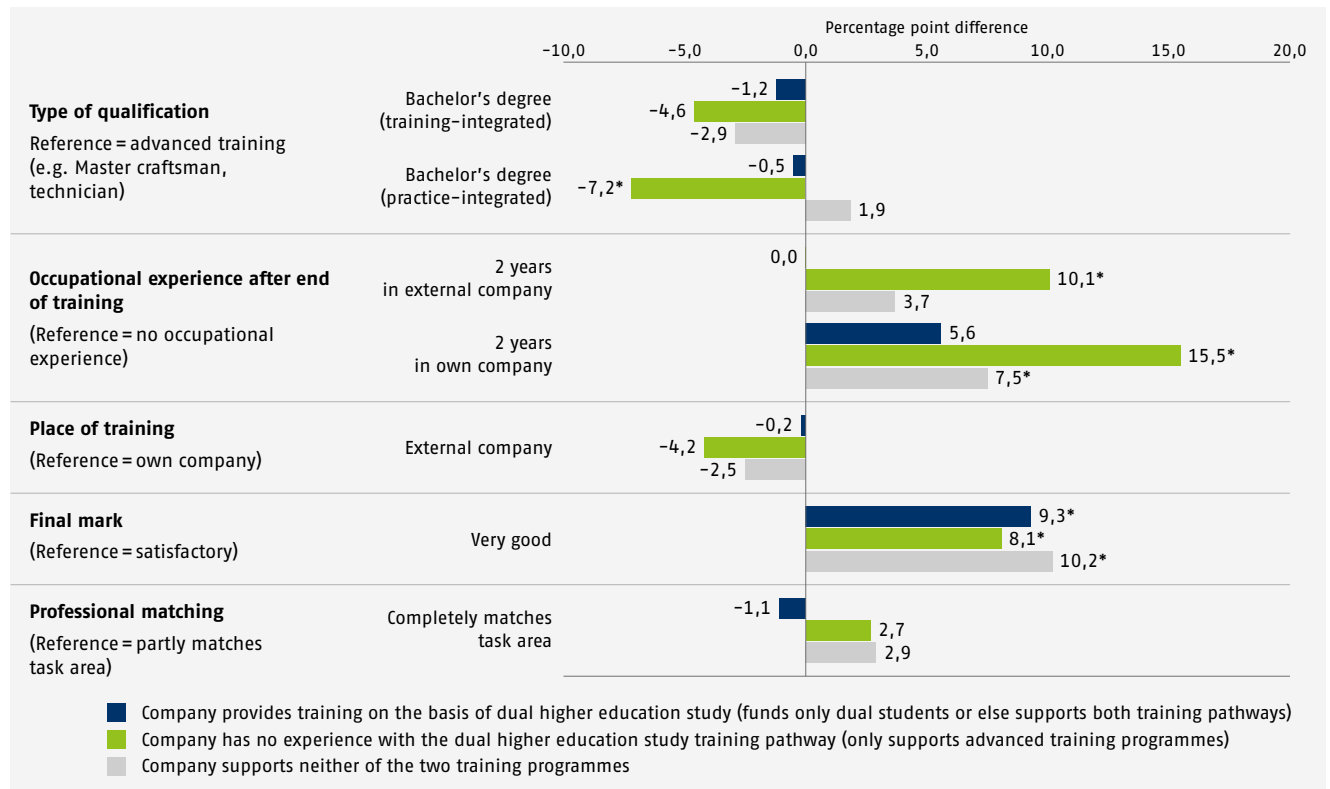
Given equal chances of selection, the likelihood that each person will be chosen (cf. example in Table) should be around 33 per cent.⁴ We are now interested in which characteristics significantly increase the probability of being selected. For this purpose, we calculate conditional logit models (cf. MCFADDEN 1973) and observe the changes in likelihood of selection compared to a reference category. The reference person has completed advanced training within the surveyed company in a partially matching task area and achieved a mark of "satisfactory" and has not yet gathered any further occupational experience.

Figure 2 (p. 40) presents the number of percentage points by which probability of selection for this reference person changes if he or she has, for example, obtained a different qualification or has acquired more occupational experience. For the purpose of the analysis, we divide the companies in the sample in accordance with their training strategy. Firstly, we consider companies, which only fund advanced training programmes and therefore have no practical experience of dual courses of higher education study (85 companies and 245 decision-making situations, blue bar in Figure 2). The second group encompasses companies, which support both qualification pathways or which offer training solely via the dual route and are thus familiar with dual students (128 companies and 366 decision-making situations, green bar in Figure 2). Finally, we consider companies, which do not finance either of the two training routes (55 companies and 153 decision-making situations, grey bar in Figure 2).

At companies, which only support advanced training programmes, persons with a practice-integrated bachelor's degree are significantly less likely to be selected for a project management position than those who have completed advanced training. The difference is 7.2 percentage points. Occupational experience and the final mark are also shown to exert a strong and significant effect. Companies, which have experience of dual students, are almost equally likely to select applicants from dual courses of study and persons with an advanced training qualification. The effect of occupational experience is much lower here, although the impact of a very good final mark remains at approximately the same level. It is also the case that no difference with regard to type of qualification held by the applicant is shown in the recruitment preference of companies not supporting either qualification pathway. By way of contrast, occupational experience and the final mark play a significant role. The importance of the applicant characteristics were also surveyed directly following the experiment. It was revealed that only two per cent of companies viewed the final mark as "very important" (54% considered this as being

Figure 2

Effects of applicant characteristics on probability of selection for a project management position



Sample interpretation: At a company, which only funds advanced training, the average likelihood that an applicant with a very good final mark will be appointed to the position is 8.1 percentage points higher than the probability that a person with a satisfactory mark will be chosen.

Source: RBS 40 (2017); N_Bachelor=1,098 applicants; N_advanced training=735 applicants; N_neither=459 applicants; marginal changes in likelihood of selection compared to reference value; significant results at a level of 10% are marked by *. The models take account of interactions between type of qualification with occupational experience and place of training.

“quite important”). Nevertheless, 39 per cent stated that “professionally matching initial/advanced training” was “very important” (55% considered this to be “quite important”). A greater degree of significance thus appears to be accorded to the final mark in a decision-making situation involving several options than is the case in direct surveys (e.g. ENGEL 2010).

Differences in scope of duties

As the evaluations subsequently collected show, respondents also associate the various qualifications with different areas of deployment within the company (cf. Figure 3). 77 per cent of companies believe that graduates with bachelor's degrees have better chances of performing “theoretical and research-based” tasks. 64 per cent also believe that such persons are more suited to “analytical and strategic” activities. Around 60 per cent of the companies are of the view that “practice and application-oriented” tasks are primarily carried out by persons who have completed advanced training. In the case of companies only supporting advanced training, in respect of which a clear prefer-

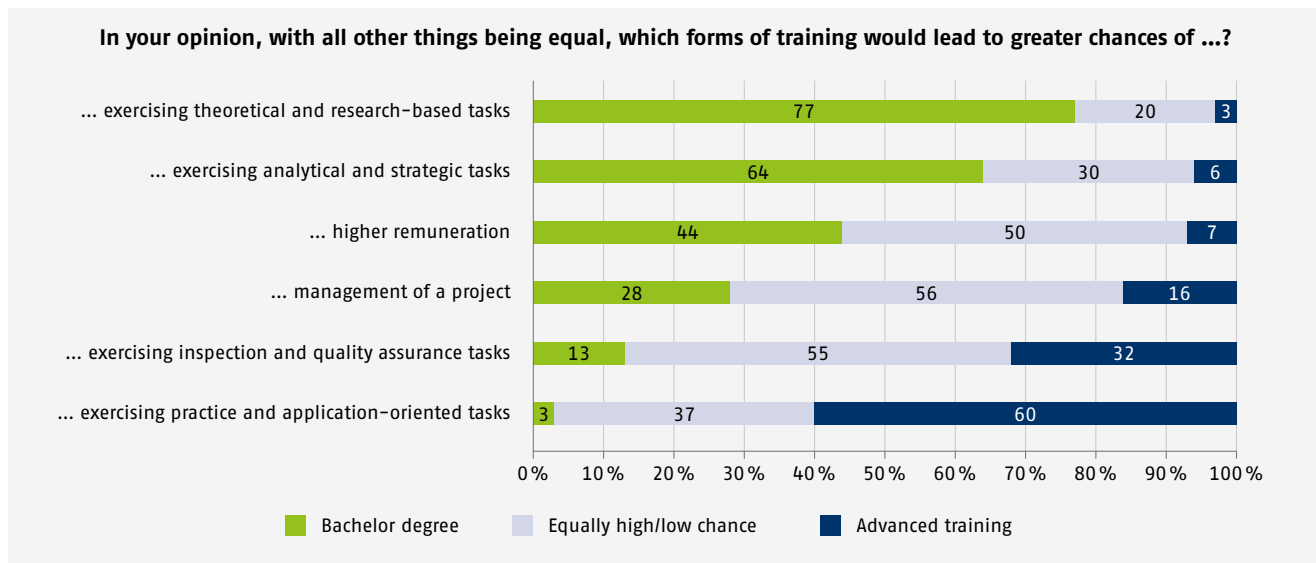
ence for persons who have completed such training is discernible in the survey, this proportion rises to as high as 75 per cent. At around a third of all companies, those with advanced training qualifications are also seen as having better chances of performing “inspection and quality assurance” tasks. Nevertheless, 55 per cent of the companies assess that the chances in this regard are equally high or low for both types of qualification. In the case of project management, more than half of the companies (56%) are unable to determine any advantage for either of the two types of qualification. However, only seven per cent of companies believe that persons with an advanced training qualification can achieve higher remuneration than graduates of bachelor's degree programmes.

The competition situation in career advancement

Assuming project responsibility represents the first rung on the company career ladder. The results show that a practice-integrated course of higher education study only exerts a negative effect if persons with academic qualifications apply externally to companies that only fund ad-

Figure 3

Evaluation of the company representatives of areas of deployment according to qualification (in per cent)



Source: RBS 40 (2017); N = 278, without missing data, percentage values rounded to whole number

vanced training programmes and do not themselves offer training via the dual higher education study route (cf. Figure 2). This company information deficit, which exists because the qualification is less standardised and less well known, can be reduced as applicants gain additional occupational experience. No significant preference for one of the types of qualification can be determined either at companies with experience of dual students or at companies which do not support either of the training programmes. To the extent that a company's training strategy does not explicitly state the aim of funding advanced training programmes, it is thus revealed that there is mutual competition between the qualifications with regard to company advancement. This is also confirmed when a direct enquiry is made of the chances of obtaining a project management position by those in possession of the different qualifications.

The results give rise to the supposition that dual higher education study will represent a serious alternative for young people as opposed to VET followed by advanced training if such dual programmes are expanded and gain greater awareness. Given the fact that chances of advancement are equal at companies, which have knowledge of the training contents, the duration of training of a bachelor's degree programme of study (approximately 3 years) is shorter than VET followed by advanced training.

The experimental design further shows that very good final marks exert a significantly positive effect on likelihood of recruitment compared to professional matching regardless of the training strategy of the company. This may be interpreted as an indication that a higher degree of significance is accorded to the cognitive ability of applicants symbol-

ised by marks than is given to specific professional specialisation traditionally imparted during a programme of advanced training. Further investigation of this would need to take place via experiments in which, for example, task areas and qualifications are more precisely defined. ◀

(Translation from the German original in BWP 2/2019:
M. Kelsey, GlobalSprachTeam, Berlin)

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Introduction of dual elements in vocational education and training in Paraguay



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The objective of the project “MoPaDual – Modelo paraguayo de Formación Dual” is to establish dual vocational education and training in Paraguay. At the request of the country’s government, BIBB is advising the Paraguayan Ministry of Labour on the establishment of institutional foundations and on the development of VET standards. This article describes the initial results to emerge from the cooperation, taking the development of occupational profiles and curricula as an example.

Paraguay – an advancing country

Paraguay is on the up. Gross Domestic Product has risen by an average of 4.9 per cent over the past few years (2003–2013), whilst the poverty rate has fallen from 44 per cent to 22 per cent over the same period (cf. ILO/Cinterfor 2017, pp. 171 ff.). Flows of investment, urban growth and technological changes all require new and adapted occupational competencies. Within this context, initial and continuing VET has an important part to play in the future competitiveness and sustainability of the Paraguayan economy. The current demand for high-level skilled work is the result of progressive investment support to strengthen competitiveness. It is also the expression of active labour promotion. Over half (56.3 per cent) of the population of Paraguay is aged under 30. Youth unemployment is more than twelve per cent (cf. ILO/Cinterfor 2017, pp. 171 ff.). Paraguayan companies bemoan the fact that workers are not trained in a practice-oriented way. VET in the country has previously offered trainees very little in the way of practical experience at companies.

BIBB’s consultancy mandate, objectives and cooperation

The Paraguayan Government believes that one way of facing up to these challenges is to involve companies in VET and to strengthen cooperation between the state and trade and industry in the planning, implementation, monitoring and financing of VET. In 2016, the Ministry of Education

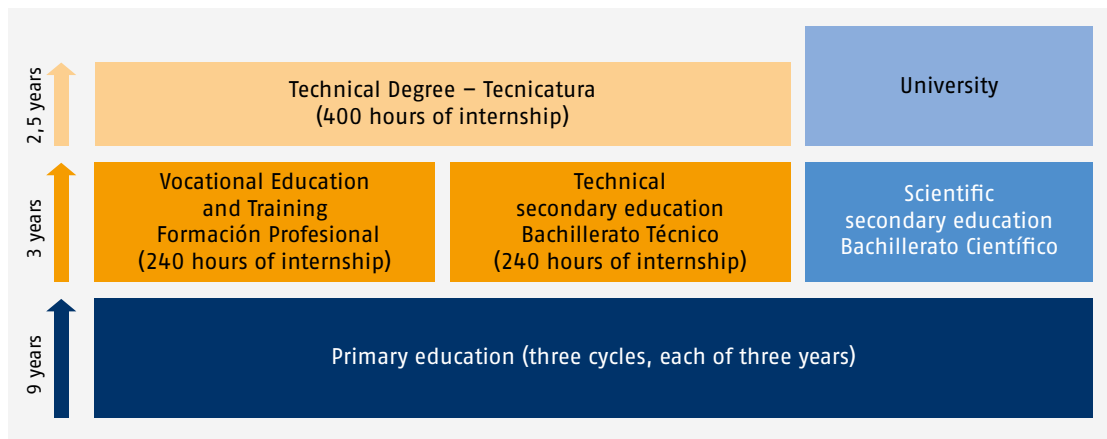
and the Ministry of Labour requested BIBB to work with stakeholders in the country on the development of a dual training model that would take existing general conditions as its starting point and would accord due consideration to Paraguayan needs. The aim was to focus on three core elements of dual VET:

- Close cooperation between the state and trade and industry
- Learning in the process of work
- Development of standards

The implementation agencies are the National System of Vocational Education and Training (SINAFOCAL) and the National Service for the Promotion of Professionals (SNPP), which offers initial and continuing training courses right across the country. Both institutions are governed by the Ministry of Labour. A MoPaDual Project Office was established within the SNPP and assigned the task of working under the supervision of SINAFOCAL to provide technical and organisational coordination for the project and the participating stakeholders. An expert from the Centre for International Migration and Development (CIM)¹ has been deployed at MoPaDual since mid-2017 to support the work being carried out.

¹ The Centre for International Migration and Development (CIM) is a working group set up by the Deutsche Gesellschaft für Internationale Zusammenarbeit [German Agency for International Cooperation] and the Bundesagentur für Arbeit [Federal Employment Agency]. Its role is to identify experts who are then posted abroad.

Figure
The formal education system in Paraguay



The initial stages of cooperation comprised an analysis of prevailing general conditions and of the institutional structures and elements of training practice in Paraguay. Needs assessments in three sectors were then used as a basis for the identification of occupational profiles in three sectors, and work began on developing practice-oriented training curricula. Measures for the training of training staff and instruments for cooperation between learning venues were also drawn up. This article concentrates on presenting the approach adopted for the development and implementation of the occupational profiles.

Vocational education and training in Paraguay

Education in Paraguay starts with early years support in nursery school and pre-school provision for children aged between 0 and 5. This is followed by nine years of free and compulsory primary education. School attendance is mandatory until the end of Year 9. Upon completion of primary schooling, young people may enter work, progress to the secondary training sector or commence intermediate level VET (cf. Figure).

In general terms, the formal education system is regulated by the Ministry of Education and Science (Ministerio de Educación y Ciencias, MEC). This responsibility includes the contents of technical secondary education and of intermediate level VET. Non-formal VET is the responsibility of the Ministry of Labour, Employment and Social Security (Ministerio de Trabajo, Empleo y Seguridad Social, MTESS). VET is essentially financed by employer contributions (1% of payroll).

Since 2014, both ministries have been working together to develop a National Catalogue of Occupational Profiles designed to help structure and synchronise the various courses offered by the ministries themselves and by further

public and private sector institutions. The intention behind the National Catalogue is to draw up occupational families containing occupational profiles at a total of five levels in 23 economic sectors.

Starting point and implementation in the MoPaDual project

The MoPaDual project used existing needs assessments in the metal working, electrical and road construction sectors as a basis for working in conjunction with trade and industry to identify and map out occupational profiles. Whereas a comprehensive sector study had already been carried out in the metal working sector in 2016, the work conducted in the area of road construction was aligned to the nascent National Catalogue of Occupational Profiles. Because profiles for the construction/road construction sector have only previously been elaborated at level 3 (technician), agreement was reached with the relevant employer association and with selected companies to commence development of an occupational profile for skilled road builder at level 2.² However, work on this profile subsequently needed to be postponed because no experienced specialist staff could be acquired.

In the metal working and electrical sectors, several workshops were held from September 2017 onwards, in which companies, training staff and teachers cooperated with further specialists from the organisations involved to develop two training profiles. Representatives from six companies in the metal working sector are participating in the process.

² In Paraguay's 5-stage qualification framework, level 2 is approximately comparable to skilled worker training at levels 3 and 4 of the German Qualifications Framework.

The working group for the electrical sector includes delegates from only two major firms, one of which is the state-owned power supply company. Company representatives comprise function holders exercising executive management tasks and company-based trainers. As well as participating in this ongoing work, the latter have also been attending a trainer programme run by SNPP, which has been developed and implemented with support from the CIM expert on the ground. The trainer programme, which has a modular structure and extends over a total period of 160 hours, offers didactic and pedagogical contents and a block providing an introduction to the dual system of VET. 37 company-based trainers and instructors of SNPP have successfully completed this continuing training scheme thus far. These *tutores de empresa* fulfil an important multiplier function and are able to bring their expertise to bear both in the structuring of cooperation between learning venues and in the curriculum workshops. They are therefore highly significant in terms of commitment within the MoPaDual project and with regard to the success of the programme.

Challenges in the development of a dual training model

Although company-based training is nothing new for companies, it largely takes place in an unregulated way. This means that there are no curricular stipulations, and such training consists of internships or induction phases.

The starting situation of the MoPaDual constitutes a major challenge for all parties involved.

- The topic of VET has been ascribed very little importance by employer associations, chambers and trade unions in the past.
- For the companies, sharing responsibility in this way and using their own specialist expertise to help shape the development of occupational training standards represent a completely new role.
- There is virtually no awareness of the notion of VET as a concept which links an overarching and broad approach with specialist training to produce skilled workers capable of flexible deployment and able react to changing requirements.
- Employment-oriented training aligned to self-contained work and business processes which places the main focus on individuals acting autonomously, while combining practical abilities and specialist knowledge with cross-cutting competencies such as team and communication skills, is uncharted territory. This applies both to the companies and to SNPP in its capacity as a VET provider which delivers courses founded on systematic theoretical and cognitive structures.

Can implementation succeed against such a background? On the basis of evaluations and a meta evaluation of projects relating to VET cooperation, STOCKMANN/SILVESTRIANI (2012) arrive at a critical appraisal of the sustainability and broad effect of VET collaboration projects. Alongside flexible project management and good general conditions, the “indispensable core elements” of successful projects have in particular been “ownership and qualified and committed staff” (ibid. p. 11).

Even the transfer and adaptation of individual elements of the dual training system requires time as well as ownership and the necessary resources because “concepts and strategies for transfer are only (able to be) developed within the scope of the specific social, cultural and economic conditions” (EULER 2013, p. 16).

Ownership and acceptance of objectives are present in the MoPaDual project both at the policy and strategic and implementation level and especially amongst the companies and training staff taking part. By way of contrast, time and resources are critical factors. Processes for curriculum development, for the establishment of suitable general legal conditions and for the creation of examination structures are all protracted. The sustainability of the project will be in jeopardy if structures and resources which will be able to support and secure the further process beyond the project term are not successfully instigated. One positive aspect is that the project enjoys a high degree of priority from policy decision makers.

Curriculum development – PlanDual

The starting situation, which has only been briefly outlined here, corresponds with the experiences so far gleaned from the development of curricula. There are separate work groups for the metal working and electrical sectors, although a joint approach is also adopted in the case of cross-cutting topics. The German training occupations of industrial mechanic and electronics technician for industrial engineering served as a reference in the case of the profiles for the two-year training programmes in the occupation of industrial mechanic and industrial electrician, and the former were presented and discussed in the workshops.

The metal working group initially arrived at a plan for the first year of training, and this has now been supplemented by a draft proposal for the second year. The working group for the electrical sector has thus far completed a rudimentary plan for the first year. These plans are aligned to a curricular stipulation produced by SNPP for the training in its VET-institute, which was expanded into a “PlanDual” by adding a company component. The PlanDual uses a list of the essential contents of the occupational profile to formulate the joint requirements made of training in the VET-in-

stitute (30%) and of company-based training (70%). It includes learning objectives for both learning venues, didactic and methodological guidance, further specifications of tools and materials and information regarding evaluation. The content requirements for each element are preceded by the cross-cutting learning objectives which characterise the occupational profile. These learning objectives each map part of the vocational ability to act to be imparted, and the aim is that they should be described in an action-oriented and competence-oriented way. The realisation of this concept remains in its infancy.

Both the further development and implementation of the plans, which have been pursued via a pilot phase since March 2018, are a major challenge for all those involved. School-based contents have hitherto tended to feature a theoretical and cognitive structure and are taught in a sequential and modular way. Interdisciplinary project teaching is virtually non-existent. Companies also continue to align themselves very closely to this model. Initially, for example, they were completely oblivious to the fact that they are not required to implement the plan on a 1-to-1 basis and are permitted to deviate from the sequential and modular imparting of contents in order to develop cross-cutting work and learning tasks which are a better match for their actual requirements and processes. Considerable action is needed in this area in order to raise awareness of the topic of action and competence orientation amongst company-based trainers and on the part of staff and instructors of MoPaDual in particular.

The curricular design work carried out shows that a number of specific company requirements cannot be brought together under a uniform profile (for example the field of foundry technology in the case of the metal working profile and the areas of high voltage engineering and refrigeration and air conditioning technology in the electrical profile). The introduction of differentiations in the second year is being considered. As developments continue, it may also be necessary for divergent requirements to be covered by new separate occupational profiles.

With regard to implementation in the companies, all participants have thus far displayed a high degree of commitment and a strong readiness to invest time and manpower in training. However, there is a variance in the way in which trainees are integrated into company practice. The spectrum here is extremely wide. There are examples where practical relevance at the beginning of training is low due to a preponderance of theory-led introductory courses, but there are also instances of very good work and project scenarios which involve trainees from the outset.

Company visits have shown that feedback from trainees is certainly positive. The directly practical part of the training is especially appreciated.

Training is managed via company training plans and by a report portfolio which provides documentation. Networking between participating companies and monthly meetings of company-based trainers and SNPP instructors also take place within the scope of the cooperation between learning venues.

Interim conclusion

Endeavours will need to be significantly extended in order to achieve the objectives of the pilot phase. Additional human resources are needed, and the stages of the process must also be realised simultaneously. The high level of commitment shown by the companies is a positive aspect, and training is functioning surprisingly well despite all the “gaps in planning”. This commitment is being driven by the company-based training staff, who are assuming a key function for the project. The continued strong motivation shown by the MoPaDual team is a further positive. The initial organisational structures and areas of personnel responsibility that have emerged offer a good foundation for future work. It has also been revealed that existing systematic approaches towards the identification of company requirements and the specific expertise of the participating stakeholders, in dealing with companies, for example, are capable of effective integration into ongoing project development. The next major challenge will be to develop suitable framework conditions and stipulations for the first practice-related examinations. These are due to be conducted as early as the spring of 2019, the halfway point of the pilot phase. Companies are devising good approaches towards preparing the practical part of the examination. But, as ever, time is short ... ◀

*(Translation from the German original in BWP 1/2019:
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GOVET is the first contact point of the German Federal Government for VET cooperation and information on the German VET system.

- ▶ GOVET guides interested parties in their efforts to engage in international VET cooperation.
- ▶ GOVET offers an overview of potential partners and funding options for VET cooperation.
- ▶ GOVET provides English translations of German VET standards, legal bases and other materials.
- ▶ GOVET's homepage offers basic information, films and standard presentations on the German VET system in several languages.
- ▶ GOVET links German and international stakeholders.
- ▶ GOVET gives advice on how to communicate VET-related subjects to different target groups.

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Approaches to dual VET in tertiary education in South Korea

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In South Korea, state reforms aim to strengthen the quality and attractiveness of vocational education and training (VET). Dual elements have been introduced in secondary and tertiary education and initial steps have been taken to improve the permeability between educational sectors and to strengthen the practical orientation of higher education. On the basis of two programmes, the article illustrates the concrete implementation as well as structural framework conditions of these policies and points out perspectives and challenges.

Strengthening the practical relevance of VET

In South Korea, the preference for higher education is traditionally strong, while VET is perceived as a second choice or even a dead end by the population. However, in view of the high level of youth unemployment, government efforts aim to strengthen the quality of VET and thus make VET attractive for young people as well as for employers. In particular, increased cooperation between enterprises and educational institutions should improve the performance of the VET sector.

VET in South Korea covers both secondary and tertiary education and has so far mainly been provided at school or in training centres. In September 2013, the government

approved the introduction of an *apprenticeship system* as a new sub-area of VET, taking the German and Swiss system of VET as a role model (cf. PARK/JEON/LEE 2018). The approach focuses on the joint participation of enterprises and educational institutions in order to better meet the skills needs of employers through work-based learning. For this purpose, school-based education is supplemented by practical training phases in companies or training centres. The conclusion of a contract between companies and apprentices and a compulsory insurance cover provide legal security for all parties involved. Practical training (*on-the-job-training = OJT*) should account for 50 to 80 per cent of the total duration. Accordingly, the proportion of school-based education (*off-the-job training = Off-JT*) is between 20 and 50 per cent.

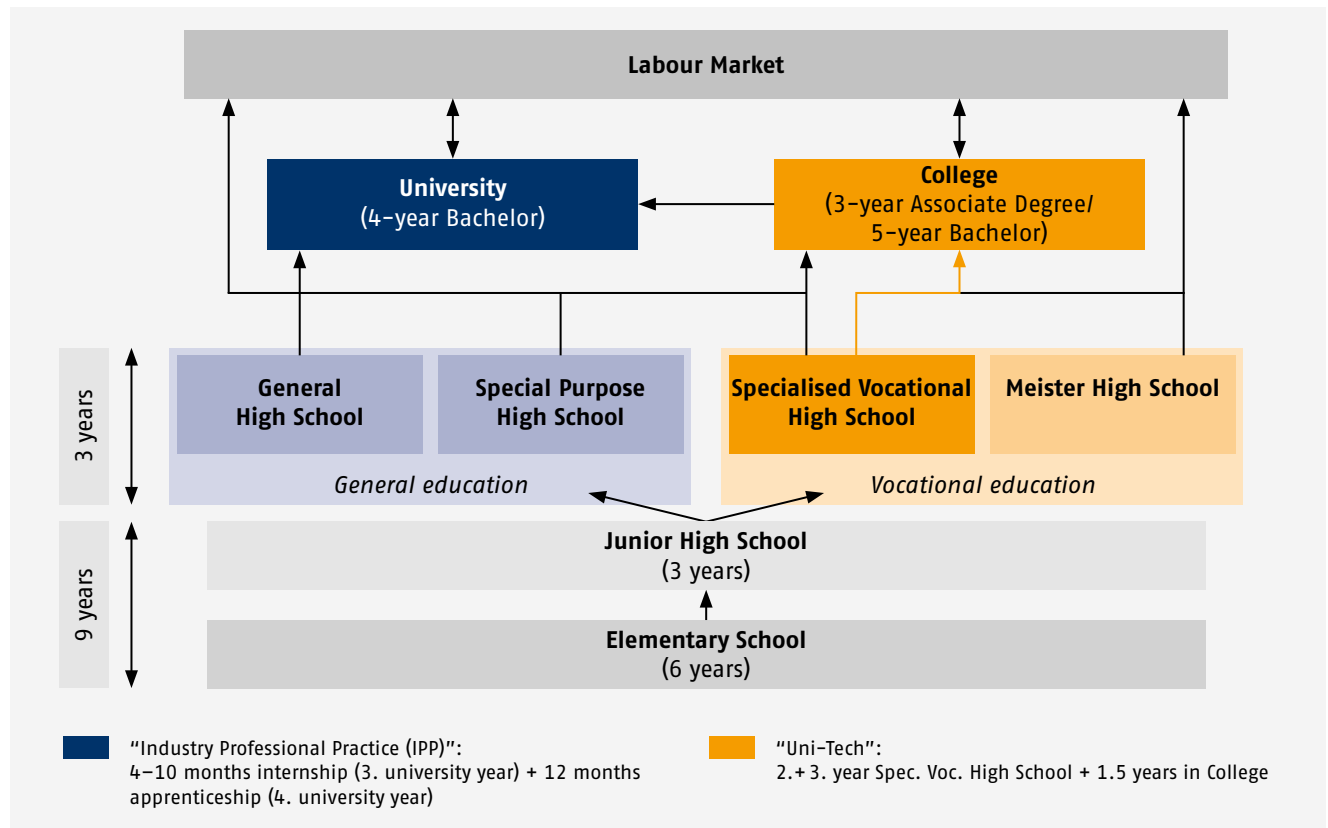
Current approaches in tertiary education

Following the reforms, further steps have been taken to strengthen the link between VET and higher education in order to improve the permeability between VET programmes at secondary and tertiary level. First of all, linking apprenticeship with academic programmes aims to enhance the attractiveness of VET. Furthermore, offering apprenticeship programmes for university and college students should ensure a practical and demand-oriented qualification in higher education to avoid a mismatch between the academic curricula and the skills needs of companies. In the following, the implementation of two programmes is explained by way of example.

* The authors would like to thank Dr. DONG-IM LEE, Senior Research Fellow at the Center for National Qualifications at KRIVET, for her valuable input.

Figure

Mapping of apprenticeship programmes in secondary and tertiary education



The programme "UNI-TECH"

The programme is aimed at students of specialized vocational high schools and takes place predominantly in cooperation with companies in the machinery, electronics and construction industry. The programme begins in the second year of a total of three years of high school education. The allocation of trainees to companies is carried out by the schools.

Following secondary school, the programme further continues for one and a half years as part of a three-year college education. Thus, the students have a guarantee of transition to a college if they are accepted into the programme and perform accordingly. At both levels of education, VET is provided as a combination of (higher) education and practical in-company training. Some of the credit points to be earned at college are acquired during the practical training phase in the company and lead to the acquisition of an Associate Degree (ISCED 5 level) in addition to a certificate about the completion of the apprenticeship programme. The details are subject to specifications of the participating colleges. From the start of the programme in 2015 until April 2018, a total of 1,557 trainees and 174 companies participated in the Uni-Tech programme. This corresponds to 2.3 per cent of all trainees and 1.7 per cent of all companies in the *apprenticeship system*.

The programme "INDUSTRY PROFESSIONAL PRACTICE" (IPP)

The IPP programme is aimed at university students in the third and fourth year of their studies. They can apply to their university for participation in the programme. In the third year, they are initially given the opportunity to gain relevant practical experience in their field of study through four to ten-months company internships. The fourth year of university is organised as an apprenticeship and students dedicate between 50 to 80 per cent of their time to the practical training in companies. The programme is interdisciplinary – typical sectors are, for instance, IT, business administration, administration and construction. Students complete their studies with a Bachelor Degree (ISCED 6 level) and a certificate about the completion of the apprenticeship programme. Since the beginning of the programme in 2015, a total of 40 universities, 595 companies and 1,472 students have taken part in the IPP programme up to April 2018. This corresponds to 2.2 per cent of all trainees and 5.9 per cent of all companies in the *apprenticeship system*.

Structural framework conditions

The legal basis for the *apprenticeship system* is Article 27 of the Employment Insurance Act and Article 20 of the Occupational Skills Development Act. Recently, a Legislative Bill on Support for Apprenticeship in Industrial Sites was ratified in the National Assembly on August 2nd, 2019. As apprenticeship programmes in tertiary education are implemented in close cooperation with higher education institutions and lead to the award of degrees, they are also subject to the Higher Education Act. The details of the organisation and implementation are determined by the higher education institutions and companies involved. The Human Resources Development Service of Korea (HRD Korea), an institution of the Ministry of Employment and Labour, oversees the design of training programmes as well as the quality assurance in the learning venues.

HRD Korea also issues the completion certificates for graduates and manages the financial support for apprenticeship programmes. The annual budget for the training in companies is provided by a fund for occupational skills development of the Korean Employment Insurance Fund, into which employers pay between 0.25 and 0.85 per cent of the gross wage depending on the number of full-time employees in the company. According to a cost-benefit analysis of apprenticeship programmes carried out by the Korea Research Institute for Vocational Education and Training (KRIVET) in 2015, the average amount of grants per company is 18.000 USD per trainee and year (cf. JEON et al. 2015). This includes the costs for the design and implementation of the programmes, including personnel costs, the training of in-company training personnel, as well as training allowance and accommodation for trainees. Compared to short-term vocational training measures, the costs of apprenticeship programmes are significantly higher: For example, the costs for the five-month programme “National key and strategic industry occupation training” average between 3.500 and 4.000 USD per person (cf. KANG 2016).

First experiences and further perspectives

The information provided show that the government has taken important steps in recent years to further increase the relevance and attractiveness of VET for young people and companies, while also taking into account the specifics of the South Korean situation. It remains to be seen how these qualifications will be perceived in the long term and whether they can be established as part of the Kore-

an qualification system on a lasting basis. This depends above all on the concrete employment opportunities and labour market outcomes for graduates of apprenticeship programmes in the medium and long term.

First experiences in the programmes also show that there is still a need for adjustments in the design of individual programmes. While the IPP programme is experiencing growing demand, the close integration of apprenticeship programmes at secondary and tertiary level in the Uni-Tech programme has been faced with challenges: In particular, difficulties in aligning the respective curricula as well as the impossibility for trainees to choose the respective college or to change their specialisation in case their preferences change have resulted in an increased drop-out rate. Therefore, the programme will gradually be replaced by an alternative, the “P-Tech” (Pathways in Technical Education) programme, which has been piloted since 2017 in cooperation with selected colleges. In contrast to the Uni-Tech programme, the one and a half-year programme is aimed at secondary school graduates of apprenticeship programmes. The aim is to create more flexibility for trainees, while ensuring greater permeability between the secondary and tertiary level of education.

There is also need for further action: The newly enacted Legislative Bill on Support for Apprenticeship in Industrial Sites is an important milestone for the legal anchoring of apprenticeship programmes. However, more effort is needed to achieve national recognition of the qualifications acquired in such programmes. So far, graduates have only received a completion certificate from HRD Korea. Furthermore, the implementation of a coherent national qualification framework, which could further improve the comparability of vocational and academic qualifications, is pending. These measures could further strengthen confidence in the VET system and ensure the recognition of vocationally oriented education and training formats and degrees in higher education in the labour market. ◀

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Introduction of dual training in Slovakia

Initial steps towards closer cooperation between schools and companies

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In 2015, Slovakia passed a new vocational education and training act which also encompasses the introduction of dual training.¹ Its provisions also include stipulations governing new opportunities for cooperation between the state and trade and industry at a national level and between schools and business both regionally and locally. This article presents these regulations and describes initial experiences with implementation by taking the development of training programmes for shoe makers as an example.

Cooperation in dual training in Slovakia

Dual training in Slovakia is governed by training regulations at a state and school level. These are the so-called training programmes. The state training programmes provide a framework in which a school can structure training in conjunction with a company. The specific design of such training is stipulated in the school-based training programmes. The proportion of practical learning undertaken at the company must be at least 60 per cent. Various state and trade and industry stakeholders work together at both levels to develop these programmes.

The *state training programmes* are developed by representatives from trade and industry and from the schools via a process which is coordinated by the State Institute for Vocational Education and Training (ŠIOV), an institution which is subordinated to the Ministry of Education and operates in a similar way to BIBB. For this purpose, the

ŠIOV appoints a commission, in which the state training programme is drawn up by representatives from schools and companies and from the umbrella organisation of the Slovakian chambers or the relevant sector associations. The ŠIOV assumes a coordinating role as well as being responsible for formal and legal scrutiny of the training programmes developed. Content development is carried out by representatives from practice. Finally, the state training programmes are definitively adopted by the Ministry of Education.

The school-based training programmes are jointly developed by a school and one or more cooperating companies. Within the scope of this programme, the state training programme may be amended to an extent of up to 30 per cent in order to take particular local circumstances and the needs of the company into account. School-based training programmes are mostly developed bilaterally and are subsequently scrutinised by the regional chambers. The focus of this scrutiny is to ascertain that the school-based programme corresponds to the state training programme in terms of content and that due consideration is according to regional labour market requirements. The chamber also checks that the tasks included in final examinations harmonise with the school-based training programme.

The statutory stipulations merely prescribe which parties should be integrated into the development process rather than setting out any specific procedural stages. For this reason, and in order to support the companies and schools, the sector associations and the umbrella organisation of the Slovakian chambers were involved in preparing a "Guide to the implementation of dual training for employers, vocational schools and school administration bodies". This provides assistance in realisation of the new system and offers a structured response to all related questions.

BIBB research project "Development of national vocational qualification and training standards – A European comparison of stakeholders, processes and design"

The aim of the project is to analyse cooperation between stakeholders involved in VET in six selected countries (Germany, Austria, Switzerland, Denmark, Slovakia and Portugal). Cooperation is compared by using the development of training regulations as an example.

Project term: 2015–2018

Further information: www2.bibb.de/bibbtools/de/ssl/dapro.php?proj=1.5.313

¹ Zákon č. 61/2015 Z. z. o odbornom vzdelávaní a príprave a o zmene a doplnení niektorých zákonov, ktorý o. i. ustanovuje systém duálneho vzdelávania; English version: www.minedu.sk/data/att/9244.pdf (retrieved: 31.01.2018)

Table
Stakeholders interviewed

Stakeholder	Number	Persons interviewed
School	1	3 (school principal, teachers)
Company	2	3 (heads of human resources and training)
Chamber	2	4 (senior management employees)

Implementation in the shoe making sector

A BIBB research project (cf. Information Box) investigated how successful the implementation of the new statutory stipulations is proving to be in practice. One of the aspects studied was the newly developed training programme for the occupation of shoe maker. For this purpose, guided interviews were conducted with the stakeholders involved in the development process (cf. Table).

Development of the state training programme

Over recent years, shoe making training in Slovakia had come to a standstill. The two largest shoe making companies in Slovakia (which are located in different regions) therefore decided to redesign the training programme on the basis of the new legal situation. They joined forces with the two schools in their regions and approached the ŠIOV with a view to initiating a state training programme. Development of content took place without regular involvement by the ŠIOV, and the stakeholders very quickly experienced difficulties in shaping the process because the assistance provided was frequently couched in terms that were too vague. “Our only aids in structuring the procedure were the law and the handbook². [...] We are autodidacts.” (school principal).

The stakeholders resolved the challenge by forming working groups and defining work packages. “We then distributed the tasks amongst ourselves depending on experience and competences.” (school principal). The function taken on by the ŠIOV in the development process tended to be of a monitoring nature and essentially consisted of “scrutinising the programme on the basis of formal and legal criteria once it had been drawn up and submitting it to the Ministry of Education for approval.” (school principal).

Development of the school-based training programme

The next stage involved substantiating the state training programme between the school and the company providing training. Aspects such as the content and scope of the

theoretical and practical learning units were stipulated in the school-based training programme, and the stakeholders also reached agreement on which parts of the practical teaching might need to be imparted by the school should the company not be in a position to deliver the full range of practical tasks. They also availed themselves of the option of adapting the training programme by up to 30 per cent to meet specific regional or company circumstances because the two companies deploy different forms of production. For this reason, the school-based training programme provides that trainees are able to learn about both types of manufacturing. The basic theoretical principles of these two production forms are imparted at the schools, although the focus is in each case placed upon the type of production used by the cooperating company.

Formal and content scrutiny for the programme was carried out by the chamber responsible. The objective here was to identify “whether the school-based training programmes take account of the requirements of the labour market [...] and whether] issues relating to the final examination or upper secondary examination conducted by the schools [...] are in harmony with the school-based training programme” (chamber representative).

Influence of the companies strengthened – companies encouraged to take the initiative

The new Slovakian law on dual VET enables companies to exert an influence on the structuring of the state and school-based training programme. The example from the shoe making sector makes it clear that companies are taking advantage of this newly created opportunity and shows how they are going about doing so. In this specific case, co-operation between the school and trade and industry even extended beyond joint development of the training programme and the division of practical teaching. Company representatives, for example, worked to develop teaching material. In the light of a shortage of qualified teaching staff, one company even made its trainers available to the school in order to deliver theoretical content.

These newly established forms of cooperation at a regional or local basis seem to be conducive to the need to provide training that is closely allied to the need for skilled workers. By way of contrast, there is a desire for clearer stipulations for the development of state training programmes.

This and other weaknesses in the law which do not relate to specific cooperation between the school and trade and industry have led to calls from companies for an evaluation and reform of the act. ◀

(Translation from the German original in BWP 2/2018:
M. Kelsey, GlobalSprachTeam, Berlin)

² “Handbook” in this case refers to the “Guide to the implementation of dual training for employers, vocational schools and school administration bodies”.

VET terminology German – English



The BIBB terminology collection with vocational training terms in German and English is intended to provide experts with valuable help in translating specialist texts in order to facilitate understanding at the international level, which is becoming increasingly important.

- ▶ translation of the German terms
- ▶ complementary definitions
- ▶ published by the Federal Institute of Vocational Education and Training 2017
- ▶ 42 p.



Available as free Download:
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List of abbreviations

Abbreviation	German	English
BA	Bundesagentur für Arbeit	Federal Employment Agency
BBiG	Berufsbildungsgesetz	Vocational Training Act
BGBI.	Bundesgesetzblatt	Federal Law Gazette
BIBB	Bundesinstitut für Berufsbildung	Federal Institute for Vocational Education and Training
BMAS	Bundesministerium für Arbeit und Soziales	Federal Ministry of Labour and Social Affairs
BMBF	Bundesministerium für Bildung und Forschung	Federal Ministry of Education and Research
BMWi	Bundesministerium für Wirtschaft und Energie	Federal Ministry for Economic Affairs and Energy
BOP	Förderung der Berufsorientierung in überbetrieblichen und vergleichbaren Berufsbildungsstätten	Supporting vocational orientation in inter-company vocational training centres and comparable VET centres
DFKI	Deutsches Forschungszentrum für künstliche Intelligenz	German Research Centre for Artificial Intelligence
DQR	Deutscher Qualifikationsrahmen	German Qualifications Framework
EQF	Europäischer Qualifikationsrahmen	European Qualifications Framework
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit und Entwicklung	German Agency for International Cooperation and Development
GMA	VDI/VDE-Gesellschaft Mess- und Automatisierungstechnik	Institute for Innovation and Technology of the Association of German Engineers/ Association for Electrical, Electronic & Information Technologies
HwO	Handwerksordnung	Crafts and Trades Regulation Code
ILO	Internationale Arbeitsorganisation	International Labour Organization
NEPS		National Educational Panel Study
VET		Vocational Education and Training

See also:

BATZEL, G.: Berufsbildungsbegriffe Deutsch-Englisch. Terminologiesammlung für Berufsbildungsfachleute [German-English Glossary of Vocational Education and Training Terminology]. 3rd edition Bonn 2017 – URL: www.bibb.de/veroeffentlichungen/de/publication/show/8376 (retrieved: 05.07.2019)

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