New work and its impacts on vocational education and training in German development cooperation

Proposition paper

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PREFACE

The topic of „new work“ is of great importance for the further design of German Development Cooperation (DC) – also in the field of vocational education. Relevant aspects are how work and employment in developing countries are changing and what consequences this implies for vocational education and training in development cooperation.

The partner countries of the German development cooperation face the challenge to adapt their vocational training systems to the changing demands of the labour market in their particular contexts. These demands are changing in the wake of globalisation, digitalisation and automation, and should be taken into account when promoting vocational education and training (VET) in development cooperation.

The following central questions arise in this context:

- What type of employment in which sectors (formal/informal) requires which competences? How is employment changing in the formal and informal labour markets in developing countries? How can we ensure that the digital divide does not widen – meaning how can those who belong to the most disadvantaged groups benefit in particular from the opportunities that digitalisation offers?
- How should VET systems be designed to meet already changed demands and continuously changing demands? What approaches to adapt VET systems already exist in industrialised countries, emerging economies and developing countries?
- What does this mean for German development cooperation – how can/should German development cooperation support developing countries to adapt their vocational education and training systems? What experiences and approaches already exist in international development cooperation and especially in the field of dual vocational training?

In order to answer these questions, the German Federal Ministry for Economic Cooperation and Development (BMZ) initiated a discussion process with national and international experts in 2018. Marius Busemeyer (University of Konstanz) and Melanie Stilz (konnektiv) – two external consultants – developed propositions on „New work and its impacts on vocational training in development cooperation“ in the fall of 2018. The propositions were discussed, adapted and supplemented by experts in the fields of development cooperation, business, science and civil society in a discussion in November 2018. They are not BMZ positions. The propositions are intended as a dynamic basis which aims to give new impulses to the further exchange process and the conceptual further development of approaches to vocational education and training in development cooperation.

Overview of the propositions presented

PROPOSITION 1: THE CHALLENGES OF DIGITALISATION
While vocational education and training faces many challenges due to digitalisation, it remains highly relevant for employment, prosperity and social inclusion, especially in the digital age. This applies in particular to less developed countries.

PROPOSITION 2: DIGITALISATION AND SOCIAL INCLUSION
Digital transformation in vocational education and training is intended to help improve the social inclusion in the training and employment system, and not to create new digital divides. Development cooperation can play a key role in this context.

PROPOSITION 3: DIGITAL UPSKILLING THROUGH VOCATIONAL TRAINING
Even in the throes of the digital transformation, the vocational training sector and the employment system remain closely connected on a functional level. In consequence, while the digitalisation of vocational education and training may promote the digital up-skilling of employment structures, it cannot enforce such upskilling. This applies particularly to less developed countries with a large informal sector.

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Digital technologies make it possible to tailor training courses to learners and their context in terms of content, methodology and technology.
This presents both an opportunity and a challenge for vocational education and training in the field of development cooperation.

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The platform economy and digital markets call for new business approaches and models. In order to make these understandable, accessible and profitable, including for the large number of micro-enterprises in developing countries, 'digital agents' can act as facilitators both between formal training and the informal economy, and between the usually theory-based training courses and practical requirements.

PROPOSITION 9: HARNESSING THE OPPORTUNITIES OFFERED BY DIGITALISATION FOR DISADVANTAGED GROUPS

The impact that digitalisation of the working world will have on developing countries cannot yet be estimated. Those groups that are already most disadvantaged run a particular risk of being excluded from the opportunities offered by digitalisation. This calls for special measures to be taken.

PROPOSITION 10: GOVERNANCE IN VOCATIONAL EDUCATION AND TRAINING

Governance in the field of vocational training is of key importance, not least in times of digital transformation. Only if all social partners work together vocational education and training can be designed such that it can respond to the ever more rapidly changing requirements on the labour market.

INTRODUCTION

Many public and academic debates are currently revolving around the potential impacts of radical technological change in the fields of intelligent infrastructure, robotics, artificial intelligence, social media and digital communication, Big Data[1] and the emergence of the so-called platform economy. Although digitalisation and automation in the working world have already made their mark in terms of how employment relationships are designed and job profiles are tailored, and have led to changes in training and education requirements, the majority of observers agree that the most significant changes still lie ahead.

This discourse is not restricted to the use of technologies, but also concerns new forms of work. These are loosely grouped under fairly vague terms such as new ways of working, new work models or agile working. Shorter innovation cycles, rapid changes in customer needs, and global competition are forcing companies to react more swiftly in terms of their strategic decision-making, product development and their responses to new opportunities, trends and risks. Among other things, this is leading to the spread of so-called agile working, which involves an iterative and highly flexible response to short-term goals. Not just work methods, but also training methods and content should be designed as flexibly and adjustably as possible. The aim is to create training offers that corresponds to rapidly changing new requirements and skillsets with appropriate speed. Especially in sectors dominated by technology, there is otherwise a risk that the content taught in the first year of training will already be outdated by the end of the course.

Rapidly changing requirements should be seen as an opportunity to keep vocational training attractive and up-to-date by means of new content and concepts. So, while digitalisation does pose new challenges for vocational training, it also offers a plethora of new tools and options for the learning process, as this paper will show.

When it comes to assessing future prospects, a growing dichotomy can be observed between the opposing camps of 'optimists' and 'pessimists'. The 'optimists' (e.g. Brynjolfsson/McAfee 2014; Schwab 2016) see the digital revolution above all as an opportunity that will create new products and services and tap into new business areas, with positive long-term impacts on employment, growth and prosperity. The 'pessimists' (e.g. Ford 2016; Collins 2014) emphasise the negative by-products of the digital revolution and fear the emergence of mass unemployment, growing inequality and further polarisation of the labour markets.

Empirical research into the actual impacts of the digital transformation on the labour markets has so far delivered mixed findings. From a historical perspective, one might point out that earlier phases of radical technological change were not attended by mass unemployment, but rather by a further long-term increase in gainful employment (Mokyr et al. 2015; Nübler 2016). However, the digital transformation can be expected to eliminate some types of employment and jobs and make them superfluous, given that routine work can be replaced by robots or software (Autor et al. 2003). New

1. Cyber-physical systems that react and operate without human intervention, such as those used in logistics and transport systems.

technologies will also create new fields of activity and forms of employment that may compensate for the loss of employment potential in traditional sectors of the economy (as Arntz et al. (2018) forecast for Germany). New employment potential will emerge not only in the IT sector, but also in other areas such as HR and social services, which are relatively better protected against automation because they are based on interactive, communicative and social activities (Eichhorst et al. 2016). The increasing modularisation of workflows and services based on digital media also offers new opportunities for outsourcing.

In the long term, this may also lead to new possibilities of cooperation with developing countries, as is already the case in the field of software development or customer service (Chew Kuek et al. 2015).

A prominent example is Samasource, a non-profit company that offers basic computer training enabling people to handle so-called microtasks. In the best-case scenario, these microtasks lead to growing experience and more complex and better-paid job orders. Samasource offers its staff in-service mentoring as well as health insurance (Samasource 2018).

Another aspect of this discussion is the question which impact the expansion of the platform economy has on employment. Although platform economy enterprises (e.g. *Airbnb, Uber* or *TaskRabbit*) only constitute a very small proportion of employment at present, this proportion is expected to grow strongly in the near future. The platform economy poses new challenges for established social insurance systems because it blurs the boundaries between employment with mandatory social security and self-employment. This poses problems especially for those self-employed individuals who work on their own without employees or are working in a disguised employment arrangement. In the worst case, platform economy enterprises might delegate their obligations to their (fictitiously self-employed) freelancers, thus undermining the established social security systems (Eichhorst et al. 2016, 2017). In the long term, this might increase the risk of inequality because different groups of the workforce have increasingly diverse types of social protection.

Sporadic examples show that future-ready technologies are being used creatively in developing countries and emerging economies, leading to new and interesting applications and business ideas. For example, there are start-ups that offer blockchain-based services, such as *Seba Labs*[2] in Nigeria and Geo Pay in South Africa[3], which use the so-called internet of things, like *Ujuzi Kilimo*[4], or that fly drones, such as *Track your Build*[5] in Sierra Leone. As in more developed countries, though, these are still far from being accessible and usable for larger sections of society. Vocational training has therefore not focused so far on handling these technologies and will probably not do so in the medium term. There are far more fundamental digital and non-digital skills such as those subsumed under the title '21st century skills' (Dede, 2009), the teaching of which may do more to prepare the ground for new employment. These include basic digital skills, flexibility and adaptability (also to changing digital tools) as well as communicative and collaborative work in teams (online and offline).

Finally, it must be stressed that there are still huge gaps in research on the changes taking place in the working world in developing countries due to digitalisation. To come up with reliable recommendations for vocational training, it would first be necessary to comprehensively collect and analyse data and take a closer look at least at some of the key aspects in this connection.

Against this backdrop, we will go on to present several propositions concerning the impacts of digital transformation in the field of vocational education and training, focusing in particular on development cooperation. These propositions were discussed during the BMZ technical discussion on 'New work and its impacts on vocational education and training in German development cooperation' with representatives from academia, the private sector and development cooperation organisations. The key messages distilled from these discussions were incorporated into the following propositions.

2. https://www.sela-labs.co/
3. http://geopay.co.za/
4. http://www.ujuzikilimo.com
5. http://tybprojects.com/

PROPOSITION 1: THE CHALLENGES OF DIGITALISATION

While vocational education and training faces many challenges due to digitalisation, it remains highly relevant for employment, prosperity and social inclusion, especially in the digital age. This applies in particular to less developed countries.

Studies on the impacts of technological change so far show a greater risk of automation for middle-skilled jobs and employment (Autor et al. 2003; Goos et al. 2014). Overall, increasing polarisation and a hollowing out of the middle can be observed. At the same time, there are empirical indications that labour market polarisation is less pronounced in countries with well-established vocational training systems than in countries where vocational training is only weakly institutionalised (Nübler 2016; Goos et al. 2014; see also Busemeyer 2015, Section 4).

Taken together, these findings imply that vocational training may offer effective protection against labour market polarisation as the by-product of technological change. This is because vocational training opens up access to well-paid skilled work also for those who do not study at university. However, the rising demand for highly skilled employment can be expected to enhance the trend to study at universities and institutes of higher education, to the detriment of vocational education and training. At the same time, there is a risk that vocational education and training will also come under pressure from employment in low-skill service jobs on the other side. The analyses cited above forecast growth in employment in these areas because certain HR and interactive services cannot be automated at present. In comparison with regular vocational training in the middle-skilled segment, these occupations are located at a low skills level with potential negative effects on wages and income inequality.

Faced with growing economic competition, companies can be expected to show less willingness (or be less able) to invest in vocational training if the skills level of jobs in the lower segment is likely to decrease.

Consequently, there is a risk that the increasing wages and employment options on the labour market will advance the internal differentiation and stratification of vocational training. Especially in countries with a well-established vocational training system (such as Germany), there is already a wide range of professions at different skills levels, from bricklayers to developers of mathematical and technical software. Increasing polarisation of the labour market will augment the differences between professions in terms of salaries, skills and previous training. A well-established vocational training system might slow the polarisation trend by providing access to highly skilled and well-paid employment also for non-university graduates. But a system of this kind will not be able

to entirely neutralise the effects of polarisation. The crucial factor is whether initial and further training continues to offer possibilities for climbing the social ladder or even expands them. For this to happen, the system would have to be made more permeable, from low-skilled to more demanding occupations and from vocational to university-level education. In the context of development cooperation, the dynamics are in principle similar, but are also marked by the specific contexts in less prosperous countries. At this point, we refer particularly to the close connection between training and employment systems (see also Proposition 3). Since the proportion of the workforce with a high level of formal education is lower in less prosperous countries than in OECD countries, vocational training plays a particular role in the former with regard to social inclusion and the strengthening of employability and economic development. Digital transformation provides the technological possibilities for breaking down complex jobs (also and especially in white-collar professions, i.e. higher-level service occupations) into smaller parts and outsourcing some of them. More demanding jobs in this field are increasingly expected to be transferred from the developed countries of the global North to the emerging economies in the global South (Brown et al. 2011). In the OECD countries, this might lead in the short term to an increase in precarious jobs or even to unemployment. In emerging economies and developing countries it might also generate a positive surge in development. At present, developing countries and emerging economies can still resort to university graduates to fulfill these more demanding jobs. In the long term, though, the vocational training sector might benefit from this trend if developing countries and emerging economies also succeed in mainstreaming vocational training beyond the manufacturing sector to the service sector.

By developing targeted projects, development cooperation might support vocational training in the service sector.

In the near future, the manufacturing industry will continue to play a greater role in the economic structure of many developing countries than in OECD countries. Globalisation and digitalisation will increase the share of knowledge-intensive services in the gross domestic product of developing countries in the long term, especially in emerging economies. In the short and medium term, however, the manufacturing industry will remain a key employment sector also for the growing domestic markets. There is a risk that production processes will be partially transferred back to the global North due to automation (see also Proposition 9). Nonetheless, the demand for labour in the middle-skilled segment (i.e. mainly vocational training graduates) can be expected to grow or at least stay the same especially in developing countries.

As in the OECD countries, the social status of vocational training in relation to university education will probably play a crucial role in determining the extent to which vocational training is considered a worthy alternative to a course of university study, and whether the training model can be successfully extended to the service sector. Hopes and expectations related to education and training might be geared particularly strongly to the university sector in countries that are experiencing rapid economic growth.

When designing training models in the context of development cooperation, efforts could be made to promote hybrid forms of vocational training that combine training and university study, alongside the classical dual training model.

In Germany, these hybrid models are being discussed and referred to as dual courses of study. Via these hybrid models, more flexible ways of involving private actors (employers, business associations) could be tried out besides linking up vocational training and university education.

PROPOSITION 2: DIGITALISATION AND SOCIAL INCLUSION

Digital transformation in vocational education and training is intended to help improve the social inclusion in the training and employment system, and not to create new digital divides. Development cooperation can play a key role in this context.

As indicated above, the implications of digital transformation in vocational education and training are ambivalent in terms of social inclusion. On the plus side, digital technologies may help to extend access to education. The dissemination of digital teaching media may help to allow previously excluded sections of the population to participate in education. However, care should be taken to ensure that the introduction of digital teaching media does not reinforce existing inequalities between 'rich' and 'poor' schools, but instead that such inequalities are levelled out by means of a coordinated and targeted investment policy.

On the downside, there is a risk that the use of digital media will create new inequalities. Where digital media are extensively used, open and non-discriminatory access to IT infrastructure (hardware, software and the internet) play a crucial role in determining the extent to which this helps achieve social inclusion or leads to new divides. Apart from access to new media, digital skills also play a key role.

School lessons should aim to level out existing differences in digital skills that might result from disparities in the IT equipment of private households owing to socio-economic factors. Efforts should also be made to ensure that the deficits in school governance that existed before the use of digital media are not exacerbated by digitalisation. For example, if schools in prosperous regions already have better qualified teaching staff, the use of digital media in teaching and learning should not mean that teachers in poorer schools are further downgraded. Instead, specific initial and continuing training should equip all teachers alike to use new media effectively in their lessons.

Even if the use of digital media is designed to be relatively barrier-free, it still calls for a certain level of commitment and skills on the part of teaching staff. Redesigning teaching content and methods to include digital media must therefore be accompanied by a reorientation in teacher training, both for vocational schools and schools that offer general education (see also Proposition 7).

PROPOSITION 3: DIGITAL UPSKILLING THROUGH VOCATIONAL TRAINING

Even in the throes of the digital transformation, the vocational training sector and the employment system remain closely connected on a functional level. In consequence, while the digitalisation of vocational education and training may promote the digital upskilling of employment structures, it cannot enforce such upskilling. This applies particularly to less developed countries with a large informal sector.

In countries with dual training structures, a close functional relationship exists between the vocational training sector and the employment system. This too has ambivalent implications. On the one hand, close coordination between vocational training and the training requirements of labour market actors ensures that in countries with a strong dual training system, the transitions between vocational training and employment are particularly successful. On the other hand, the quantitative and qualitative range of training opportunities depends heavily on fluctuations in the economic cycle. There is also a risk that companies will be too strongly influenced in their training decisions by existing production and HR strategies, which might impact negatively on the system's potential for innovation. This poses fewer problems if other functionally equivalent driving factors such as the constraints of global competition keep companies on their toes in terms of innovation. In less developed countries, where companies specialise in the production of low-skilled, low-quality goods, there is a risk of falling into the low skills trap because companies have fewer incentives to invest in more demanding vocational training (as Finegold and Soskice argued with reference to the UK back in the 1980s, see Finegold/Soskice 1988). This calls for a difficult balancing act on the part of development cooperation organisations.

On the one hand, an attempt can be made to adapt existing employment structures and improve their digital skills via the digital transformation of vocational training (both by using digital media and by adjusting professional structures and training content). Small and medium-sized enterprises (SMEs) in particular might benefit from the digital transformation of vocational training because they rely more heavily than large companies on external support in this area. Vocational training graduates may thus help to disseminate new skills and competencies and may strengthen the innovative potential of the economy. On the other hand, it makes little sense to create new training courses if there is no real demand for them on the labour market. This means that well-trained skilled workers must have access to the corresponding employment structures if the innovative potential that may be unleashed by the digital transformation of vocational training is to be really used.

Summing up, there is some, if not unlimited scope, within which the digital transformation of vocational training can mobilise equivalent employment potential. Detailed analysis of the existing employment structures and training requirements is a key prerequisite for striking a successful balance between upskilling that is steered via the range of training courses

offered and the scope that is limited by employers' demand for specific qualifications.

Here again, digital technology can be useful because new analytical methods (keyword: Big Data) provide new sources for data collection and analysis. New technology options such as blockchain-based certification tools may also help to certify vocational qualifications better and more reliably. This enhances the transparency of training systems and thus establishes a better link between the training and employment systems.

The targeted use of digital technology can help to improve labour market statistics and information systems. This applies particularly in the context of development cooperation because the informal sector is much larger in less developed countries than in the OECD states.

In the informal sector, it is much more difficult to introduce and build reliable certification systems. New IT-based procedures, especially those used to recognise informally acquired competencies and skills, can be especially useful here.

These new forms of access and new technologies should not, however, lead to the complete replacement of traditional, non-IT-based certification procedures. Instead, training at existing institutions and new digital technologies should complement each other. Private actors, especially professional, business and employer associations, play a critically important role in stabilising the vocational training system and ensuring that employers participate in training (Busemeyer 2012). This also applies to a particular extent to development cooperation (GIZ/KfW 2016). The certification of vocational qualifications is a powerful lever for sustainably involving private actors and associations in steering vocational training, and may in turn have a positive impact on the willingness of individual companies to offer training. Formal certification also of informally acquired skills provides access to further education opportunities. Private actors and associations can be involved in decisions concerning the design of training and job profiles via the responsible state authorities (chambers of commerce, regional or national vocational training councils or educational institutions themselves). This in turn acts as a strong incentive for individual companies to engage in 'their' association and thus to spell out their specific qualification requirements. In this type of 'corporatist' system for determining reciprocal interests, associations can then voice and assert their public concerns and interests vis-à-vis their member companies, especially as regards corporate involvement in vocational training (Streeck/Schmitter 1985). The use of digital technologies in certifying vocational qualifications should, therefore, be designed such that it supports this process of voicing and amalgamating interests.

PROPOSITION 4: DIGITAL TEACHING AND LEARNING METHODS

Digital transformation in vocational education and training concerns both training content (curricula) and teaching and learning methods (digital media). These aspects should be considered separately also in the context of development cooperation and their impacts should be critically analysed and differentiated.

Digital transformation of the working world will lead to new training requirements. Training content needs to be adjusted accordingly. On the one hand, this concerns the creation of new professions and professional environments (for example in the IT sector and related areas), and on the other, the enrichment of curricula for professions in other sectors that will be increasingly affected by digital transformation. The latter concerns the digital upskilling of existing professions and forms of employment, which from a purely quantitative perspective probably affects a larger proportion of the workforce than the creation of new IT jobs itself.

In the development cooperation context, digital upskilling represents a special challenge because the required skills are frequently not in place.

Even in Germany, the introduction of IT professions in the 1990s showed that a lack of skills on the part of training staff (or the lack of training staff full stop) can lead to bottlenecks, if training models depend on the existence of such skills at companies. Another challenge is the frequent lack of technical infrastructure. This applies in particular to vocational schools, which are often, owing to tight public budgets, unable to respond as swiftly to new technology trends as private sector actors. SMEs in particular are challenged because they have fewer funds at their disposal than large companies for making the relevant investments.

The digital transformation of the working world not only means that new vocational training content needs to be added, but also that digital technologies provide new teaching and learning methods that can compensate in part for the expected challenges. The use of digital teaching and learning methods such as e-learning, massive open online courses (MOOCs) and mobile learning (m-learning) via tablets, smartphones and notebooks may encourage the broad dissemination of learning content, provided access to new digital media is open and non-discriminatory (see also Proposition 2). Digital media make it possible not only to clearly prepare and present complex content, but also to compensate in part for potential and temporary skills deficits on the part of teaching staff.

Since there is an empirical link in OECD countries, and probably an even stronger one in developing countries, between the quality of teaching staff and local socio-economic conditions (more poorly performing teaching staff teach at poorer schools), the dissemination of digital teaching and learning methods might particularly benefit students in disadvantaged regions.

Nevertheless, the introduction of digital and digitally supported teaching and learning methods should be critically examined in terms of its effectiveness. E- and m-learning can support analogue learning processes in the real working world but not completely replace them. Learning at the workplace remains relevant in the context of digitalisation as well. Particularly in vocational training, professional and in-company practice continue to be essential in order to obtain sustainable and successful learning outcomes. This is also confirmed by studies on the link between the use of digital media in schools and educational performance, which overall come to mixed conclusions (OECD 2015: 15; Falck et al. 2018); i.e. there are no clear indications of a positive link between the use of IT at schools and educational performance. In the case of the USA (which has pioneered digital transformation in the education and training sector due to the strong position of its technology companies), there is growing concern that schools may become overly dependent on the products and services of technology companies, and that this might lead to a downgrading of schools' teaching staff (Singer 2017; Münch 2018).

The latter aspect is particularly important in the development cooperation context. The digitalisation of education should not lead to the replacement of local teaching staff or make them superfluous, but should aim to make these technologies accessible for the initial and in-service training of teaching staff.

While the Masai (an ethnic group that lives in Tanzania) continue to hold on to their traditions, they are also surprisingly open to technological progress that improves the group's standard of living and supports economic activity.

PROPOSITION 5: SKILLS IN TOMORROW'S WORKING WORLD

It is becoming increasingly hard to predict the knowledge and skills that will be needed in tomorrow's working world. Modularised initial and continuing training courses in technology-oriented professions make it possible to adjust rapidly to the ever-changing realities on the labour market. Both industrialised nations and developing countries face these challenges in equal measure.

Owing to increasingly rapid changes in customer needs, shorter innovation cycles, geographically expanding markets and the explosive growth of new technologies, it is becoming ever harder to predict what requirements this entails in terms of vocational qualifications. While there is broad consensus that the existing high demand will continue to grow in fields such as data analysis, software development or IT security, there is not yet any clear idea of the professional requirements and new or altered fields of work that can be expected in the often-cited technologies of the future, such as virtual reality (VR[6]), augmented reality (AR[7]) or blockchain.

These new skills do not only concern initial vocational training. As requirements change more and more rapidly and frequently, digitalisation will also create an enormous need for life-long learning. Vocational education and training, which is shorter than university study and accessible to a larger group of people, is equipped to address precisely these requirements more rapidly and practically. It can also respond to these requirements by including the relevant skills in certificates or micro-degrees both as a module in existing training courses and as separate additional qualifications. However, a holistic approach should be taken when designing modular vocational training courses so as to guarantee that learners acquire comprehensive vocational proficiency. Another special challenge when creating modular vocational training courses lies in ensuring that the teaching content is coherent. This creates requirements to be met by decision-makers when planning and steering flexible vocational training and by vocational training staff as regards the coherent selection and implementation of individual modules.

6. Virtual reality: completely computer-generated environments that are experienced via a headset
7. Augmented reality: a computer-generated extension of reality and layers of reality projected onto real-world environments in real time

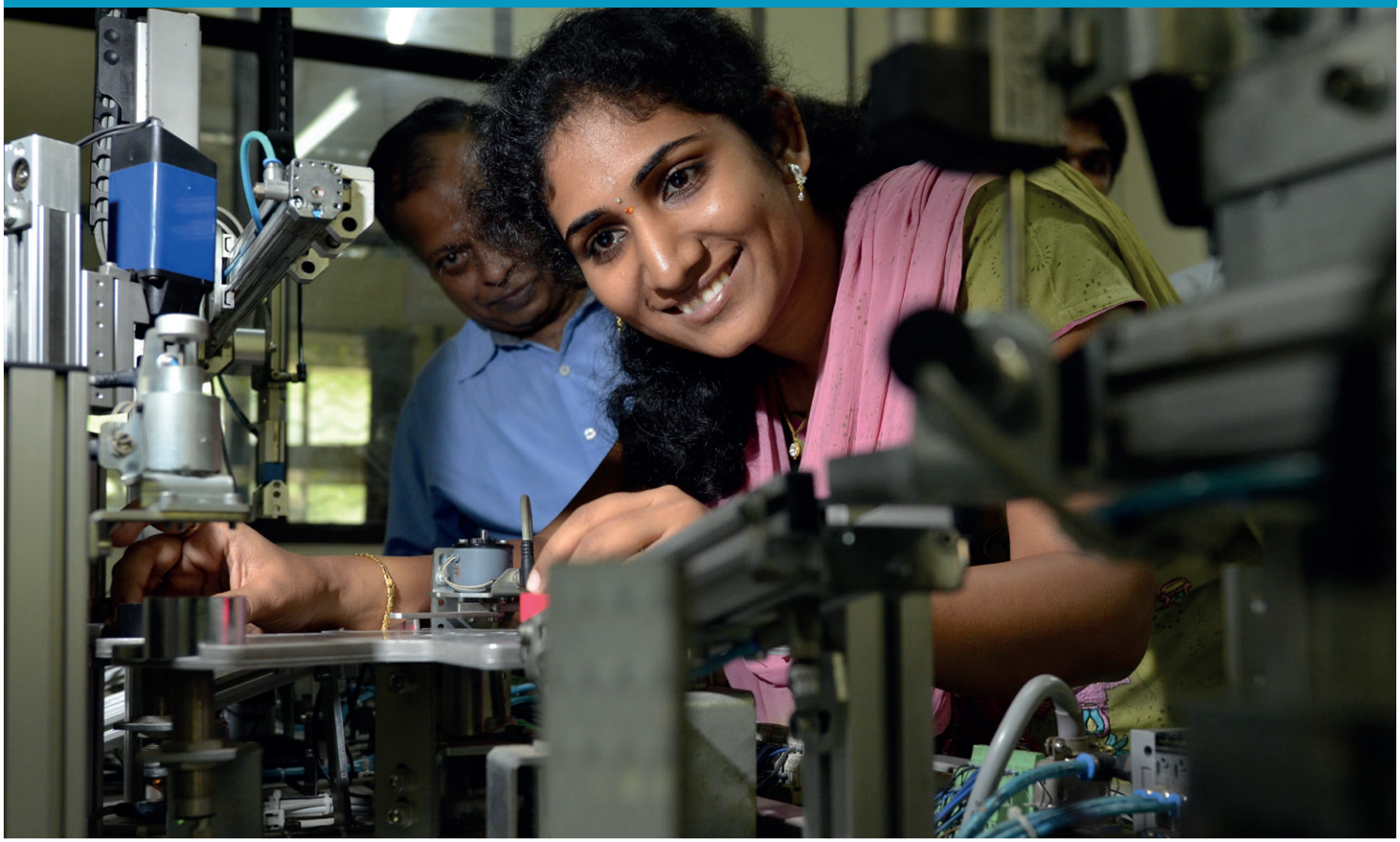
In developing countries whose education and training infrastructure is weak, lacking or difficult to access, new forms have to be created so that disadvantaged groups also have access to initial and continuing training courses. Digitally-based training courses that give consideration to existing work and training structures (including the availability of equipment and internet access) and their requirements may help to compensate for these deficiencies (see Proposition 6).

Digital certification systems such as digital badges can also lead to recognised diplomas in addition to the existing formal certification options (see for example Mozilla 2011). For example, language skills, computer expertise or specialist knowledge in the health sector can be digitally certified via recognised training partners. This is an area in which blockchain technology will play a substantial role by making it possible to transparently trace where and through whom a qualification was acquired in the form of a digital badge. Most examples of digital badges are currently used in Europe and the USA (Araújo, Santos, Pedro, & Batista 2017; Roy & Clark 2018). Their application in developing countries is considered to be promising (Beals et al. 2015; Jobe & Hansson 2014; Law 2015).

There is great demand for initial and continuing training for computer programmers in Viet Nam.

PROPOSITION 6: NEW TRAINING COURSES – OPPORTUNITY OR CHALLENGE?

Digital technologies make it possible to tailor training courses to learners and their context in terms of content, methodology and technology. This presents both an opportunity and a challenge for vocational education and training in the field of development cooperation.



New digital tools and platforms make it possible to personalise learning and to adapt it to individual needs. This holds not only to what is learned, but also where, at what speed and how. Adaptive learning technologies can use data to generate learning recommendations and courses that are tailored to individual needs. Rather than being subjected to a predetermined style, speed and level of teaching, learners can select the methods that match their learning preferences and expectations and combine them as they see fit.

Digital learning environments make it possible to adjust content to local requirements, challenges and specificities rather simply, and thus use the content in different contexts. That may entail linguistic or cultural adaptation but also barrier-free access to various types of equipment (simple mobile phones, feature phones or smartphones). This enables people in a wide variety of situations to co-design a digitally supported learning environment that corresponds to their means of access and learning needs. They can listen to presentations on their headphones while doing their housework, watch learning videos in a library in the afternoon and solve the corresponding exercises in the evening via app or learning environment using the family's smartphone or tablet. This example shows that teaching staff too will assume a new role as curators of learning. They are increasingly required to identify a selection of suitable offerings of adequate quality that complement face-to-face learning and are available to learners outside fixed teaching hours and locations (see also Proposition 7).

It is easier to gamify learning content and thus to make it accessible in new ways to learners with a low level of education. One example is the language app Duolingo[8]. The data produced during this playful learning are used as feedback loops that provide information about the skills and needs of learners (and the success of the teaching courses) and can thus be individually adjusted.

8. https://www.duolingo.com/

The Tanzanian German Programme to Support Health promotes the development of digital skills in Tanzania

Learning opportunities can also be adjusted and combined in response to the prevailing technical conditions. This makes it possible to dovetail the use of low-tech and high-tech solutions. Virtual reality and augmented reality are transformative technologies that may offer useful immersive learning experiences in certain contexts, also across large distances between teachers and learners. One example is the use of AR headsets when teaching staff to use a new machine at one of the cement works of Lafarge Holcim in Nigeria by an expert located at the company's head office in Switzerland. This practice was tested with help from experts at the local AR/VR lab *Imisi 3D*[9]. While augmented reality solutions cannot be used without a fast internet connection and high-quality smartphones, and are therefore often linked to specific companies or training providers, language- or text-based exercises can supplement such training offerings, and also be called up in rural regions using simple mobile devices.

As part of vocational training, digital teaching methods and e-learning can help to adjust training content more effectively to the needs of different target groups. Learning on the job is nevertheless essential for the comprehensive acquisition of vocational proficiency. Digital learning technology can therefore supplement vocational training formats but not replace them entirely (see also Proposition 4).

9. http://imisi3d.com/

PROPOSITION 7: TRAINING FOR VOCATIONAL SCHOOL STAFF

To prepare learners appropriately for the changes they will face in the working world, vocational school teachers require initial and continuing training. To retain teachers in digital environments, working in the teaching profession must be an attractive job option in developing countries.

The lack of experts in technological and digital working environments concerns developing countries and industrialised nations in equal measure. So far, universities have been considered the primary training option for these fields, although enormous potential exists here for vocational training.

In most developing countries opportunities to acquire relevant vocational credentials are lacking; it is also more difficult there to recruit and retain suitable teaching staff due to the much lower wages they receive as compared to the private sector (Stilz 2015). Here, strategies must be developed, for example, on how to provide formal diplomas for the required digital skills in cooperation with the private sector, and how the suitable staff can, if necessary, unite theory and practice.

In the technology and digital sector, it is common practice in many developing countries for people to have a private sector job in addition to teaching. This is a financial necessity for the people concerned, and should be reflected in a suitable official arrangement. This would ensure both adequate practical experience and familiarity with current developments. Impartial bodies must, however, be involved to ensure that teaching is not used to advertise products or to primarily teach the systems and solutions of dominant providers in the market.

The rapid changes that are taking place in the working world not only call for digital skills and competencies. So-called '21st century skills' are becoming increasingly important for all occupations (UNESCO 2008), especially in view of the large number of self-employed people and micro-enterprises in developing countries (Blattman & Dercon 2018).

Assets such as flexibility, adaptability or initiative play an increasingly important role in the constantly changing working world throughout an individual's lifetime. Building these skills during training represents a challenge that has so far not been sufficiently taken into account in German vocational training, and that is now being given more attention. This is an area in which German development cooperation could work together with partner countries to develop and pilot models.

The following challenges should be taken into account:

- Practical orientation should be systematically integrated into teacher training (both in-company practice and pedagogical/didactic practice).
- 'Digital didactics' should not consist solely in transferring analogue processes to digital ones (e.g. designing a worksheet as a pdf file rather than printing it on paper). The use of digital elements in teaching and learning means that teachers need to be trained to use and integrate digital tools.
- The changing way in which teachers view their role, moving away from technical experts to technical curators or curators of learning, who support an autonomous learning process.
- The teaching profession must be attractively designed, for example by making it possible to undertake practical work as well as teaching or by means of ongoing continuing training. This can at least reduce the number of teachers who migrate to the private sector.

PROPOSITION 8: PLATFORM ECONOMY AND DIGITAL AGENTS

The platform economy and digital markets call for new business approaches and models. In order to make these understandable, accessible and profitable, including for the large number of micro-enterprises in developing countries, 'digital agents' can act as facilitators both between formal training and the informal economy, and between the usually theory-based training courses and practical requirements.

Informal employment is still the norm in most developing countries. In Africa, 85.8% of employees work in the informal sector. In Asia/Pacific, the proportion is 68.2%, and it is 68.6% in the Arab states (International Labour Office 2018). The formal education and training sector is usually small and bears little relation to practice (Lolwana in: Eicker, Haseloff, & Lennartz 2017).

In the traditional training of apprentices or on-the-job training in particular, there is often little opportunity to take advantage of formal training courses, for which fees are usually charged (Oketch 2007).

To offer the majority of the workforce the opportunity to participate in the new digital markets, new interfaces must be created also in development cooperation that make this transfer possible.

One initial prerequisite is basic digital training in the use of digital equipment and services, which must be part of all initial and continuing vocational training[10]. Only this can provide access to further services such as

- digital advisory services, especially specific information related to occupational health and safety or medical care in a given profession;
- information about the services and options offered in terms of digital insurance (such as income protection insurance) and social insurance via mobile credits, such as are offered in Ghana (People's Pension Trust),
- local digital services such as savings cooperatives or micro-loan systems, local logistics services
- help with access to and use of local gig-economy platforms.

10. Only those who can read and write can take part in the digital transformation in the first place. Basic education must therefore lay the foundations for digital skills. This proposition paper does not go into this aspect any further.

In formal vocational training systems, building such advisory skills among teachers is usually a protracted process, especially since they usually have little experience on the rapidly changing digital labour market.

It is quicker and more efficient to work with 'digital agents' who have adequate experience of local or even global digital markets and who operate in the continuum between business development and digitalisation. These agents may be local NGOs with corresponding expertise on the labour market or other local providers with business development expertise.

An example of such a project is the *Pilot Business Process Outsourcing* (BPO) project: *Refugee Employment & Skills Initiative* (RESI) operated by the Norwegian Refugee Council together with the International Trade Centre. The existing range of vocational training courses for refugees in Dadaab Camp, Kenya, has been expanded to include a digital component that is meant to provide access to digital markets (ITC 2018). Besides basic digital training, this also includes aspects of digital work such as finding, applying for and carrying out job orders via job platforms.

The growing number of increasingly popular FabLabs and Tech Hubs (GIG 2017; World Bank 2016a) give actors the possibility of connecting with the global economy, at least in many of the larger cities, also in development cooperation partner countries. These open spaces usually combine co-working, i.e. the temporary provision of fully equipped workplaces for start-ups and workshops for digital production, with digital training courses.

Kumasi Hive in Ghana (Kumasi Hive 2017) is an example of such a successful cooperation arrangement with training institutions and the informal economy.

Young people at a workshop discussing how to design the youth-friendly 'Femina Hip' website in Tanzania.

PROPOSITION 9: HARNESSING THE OPPORTUNITIES OFFERED BY DIGITALISATION FOR DISADVANTAGED GROUPS

The impact that digitalisation of the working world will have on developing countries cannot yet be estimated. Those groups that are already most disadvantaged run a particular risk of being excluded from the opportunities offered by digitalisation. This calls for special measures to be taken.

The expected consequences of automation are currently being discussed mainly with regard to industrialised countries. Hardly any valid figures and studies are as yet available regarding the impacts on developing countries (Gelb & Khan 2016). In the World Bank's World Development Report 2016 on digital dividends, the authors come to the conclusion that the loss of jobs due to automation in developing countries will be moderate as compared with the OECD average. This is, however, based on the premise that technologies will be disseminated much more slowly in poorer countries, while wages there will remain much lower than in the global North (World Bank Group 2016).

In the global North, some of the low-skilled routine jobs concerned have already been transferred to other countries. The much lower wages for routine jobs, such as hardware assembly or jobs in the textile industry, still fill factories in many developing countries and emerging economies at present. However, these jobs are precisely the ones that are increasingly being automated. According to pessimistic forecasts, in the medium term they may be transferred back to the global North in order to keep transport and logistics costs low (Brynjolfsson, McAfee, & Spence 2014). Not enough research has yet been done concerning the effect this 'backshoring', as the retransferring of production processes back to the global North is called, will have on global value chains. This is the subject of heated debate (Lütkenhorst 2018). The impacts of the digitalisation of production processes on employment structures in developing countries and emerging economies cannot therefore be predicted at this point in time.

Whereas cyber-physical systems and M2M (machine-to-machine communication) are currently being adopted by industrialised countries, many developing nations are busy providing basic digital infrastructure (Pepper 2015). The digital divide is growing, and not even the ubiquitous spread of mobile phones with internet access (which is still a long way off) will compensate for this difference. The cherished vision of leapfrogging, where actors can participate directly in the digital economy thanks to inexpensive technology and mobile internet (Sachs et al. 2015), is only realistic for a very small, privileged tranche of the population (Unwin 2015).

Those who have so far had no or at most limited access to digital devices and digital training, as well as to basic digital rights (women, the rural population, the poorest section of the population), are at grave risk of being excluded from the potentials of digitalisation (World Bank Group 2016).

Despite its huge relevance especially for sustainable economic growth and decent work, this aspect has been largely ignored, also in the United Nation's Sustainable Development Goals (Stilz 2016). In this respect, the international community is called upon to adopt joint resolutions that will help ensure the digital divide does not continue to grow.

The challenge that faces the working world in developing countries is to strike a balance between the slower digitalisation of the local markets in many sectors and thus between initially smaller changes on the one hand, and the adjustments that are required so that these countries can hold their own on increasingly digitalised regional and global markets.

In order to reach the groups at greatest risk of being excluded, special vocational training courses are required in addition to general measures such as expanding digital infrastructure and offering courses at training institutions. These special courses include ones that are tailored to the everyday realities of women; courses that address low reading and writing skills; and courses that can be accessed also in remote regions. This is the only way the international community can honour its commitment to leaving no one behind.

To prevent the digital gap from widening even further and to combat further marginalisation, the following steps must be taken:

1. disadvantaged groups must be identified (in line with the 'leave no one behind' principle of the 2030 Agenda (UNDP, 2018) and
2. they must be given special consideration when designing vocational training systems. This should be based on Principle 1 ('Design with the user') and Principle 2 ('Understand the existing ecosystem') of the Principles for Digital Development that have been signed by GIZ as well as organisations such as USAID, the World Bank or UNICEF.

On behalf of BMZ, GIZ advises its Vietnamese partner institutions on developing needs-based training modules. Continuing training for teachers plays a key role in this context.

PROPOSITION 10: GOVERNANCE IN VOCATIONAL EDUCATION AND TRAINING

Governance in the field of vocational training is of key importance also in times of digital transformation. Only if all social partners work together can vocational education and training be designed such that it can respond to the ever more rapidly changing requirements on the labour market.

If we compare vocational training systems from a historical and international perspective, we see that it is essential for all social partners to be involved in designing the governance of such systems in order to achieve the right balance between the private interests of market players and public concerns (Busemeyer 2012, 2015). If vocational training is too strongly privatised, this may lead to market distortion, reduced quality, inequitable access to vocational training and to new dependencies. Here, the state must step in and regulate the relevant processes so as to enable a balance of interests between the stakeholders involved. The institutionalised involvement of the various stakeholders in vocational training (the state, employer and professional associations, trade unions and civil society) can help to ensure that job profiles are regularly adjusted to the changing conditions and needs of the working world without losing sight of the social inclusion aspect. In order to successfully adjust vocational training to the challenges of digital change and to handle the relevant processes, it may be particularly effective to collectively mobilise the experiential knowledge that is dispersed among the various market actors. This must be supported by evidence-based labour market and occupational research.

Particularly in the throes of digital transformation, institutionalised research and advice on labour market and training needs are necessary to enable the evidence-based governance of vocational training. This is where German development cooperation organisations offer interesting approaches and models.

Also in the field of development cooperation, care must be taken to involve the relevant stakeholders in governance to the appropriate extent. Since in many developing countries the informal sector encompasses large sections of the economy, representatives of this sector should also be brought on board.

If this is done, the institutionalisation of a dialogue involving all social partners can also help promote capacity building among association members (GIZ/KfW 2016). At the same time, it must be ensured that the state retains its capacity to act and does not submit to individual interests of stakeholders. The role of the state within a collective vocational training system of this type is to organise and facilitate the dialogue between stakeholders, thus ensuring a harmonious balance between public and private interests.

The German model of the dual vocational training system with its cooperation bodies at different levels (cooperation regarding training locations, vocational training committees at chambers of commerce, the Main Board of the German Federal Institute for Vocational Education and Training (BIBB), etc.) can provide ideas for structures that are adapted to the local context in the partner countries of German development cooperation.

FUTURE PROSPECTS

The current discussion paper represents a first result in a complex process for the conceptual development of approaches to promote vocational education and training in development cooperation in the context of „new work“, digitialisation and automation.

The ten propositions presented in this document are intended as an impulse for further discussions. The results of these discussions and well-proven examples will be used to develop recommendations for policy dialogue and for project design. These will be made available to the relevant public in the coming months. They are to provide decision-makers and practitioners in development cooperation with inspiration for their own practice. In this way, we can ensure that vocational education and training in development cooperation responds to the challenges of “new work” and takes advantage of its opportunities.

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