Bünning, Frank [Hrsg.]; Hennige, Tamara [Hrsg.]

Empowering vocational education in Georgia. Insights into the German-Georgian research project VoCasian

Bielefeld : wbv Publikation 2025, 161 S. - (Vocational education, work and innovation; 85)

Quellenangabe/ Reference:
Bünning, Frank [Hrsg.]; Hennige, Tamara [Hrsg.]: Empowering vocational education in Georgia. Insights into the German-Georgian research project VoCasian. Bielefeld : wbv Publikation 2025, 161 S. - (Vocational education, work and innovation; 85) - URN: urn:nbn:de:0111-pedocs-333253 - DOI: 10.25656/01:33325; 10.3278/9783763977178

https://nbn-resolving.org/urn:nbn:de:0111-pedocs-333253
https://doi.org/10.25656/01:33325

in Kooperation mit / in cooperation with:

wbv Publikation

http://www.wbv.de

Kontakt / Contact:

peDOCS
DIPF | Leibniz-Institut für Bildungsforschung und Bildungsinformation
Informationszentrum (IZ) Bildung
E-Mail: pedocs@dipf.de
Internet: www.pedocs.de

Frank Bünning, Tamara Hennige (Eds.)

Empowering Vocational Education in Georgia

Insights into the German-Georgian research project VoCasian

(85) VOCATIONAL EDUCATION, WORK AND INNOVATION

wbv

Empowering Vocational Education in Georgia

Insights into the German-Georgian research project VoCasian

Frank Bünning, Tamara Hennige (Eds.)

The series **Vocational Education, Work and Innovation** offers a forum for basic and application-oriented vocational education and training research. It makes a contribution to the scientific discourse on innovation potentials of vocational education and training. It is aimed at a specialist audience from universities and research and research institutions as well as from school and company policy and practice fields.

The series is divided into two main areas:

- Vocational education, work and innovation (main series)
- Dissertations/Habilitations (sub-series).

Series editors:

Frank Bünning, Tamara Hennige (Eds.)

Empowering Vocational Education in Georgia

Insights into the German-Georgian research project VoCasian

wbv

Vocational training, work and innovation, volume 85

2025 wbv Publikation
a business division
wbv Media GmbH & Co. KG, Bielefeld

Overall production:
wbv Media GmbH & Co. KG
Auf dem Esch 4, 33619 Bielefeld
service@wbv.de
wbv.de

Cover design: 1expert, 123rf

Order number: I77161
ISBN (Print): 978-3-7639-7716-1
ISBN (E-Book): 978-3-7639-7717-8
DOI: 10.3278/9783763977178

Printed in Germany

Bibliographic Information of the Deutsche Nationalbibliothek (German National Library)
This publication is registered in the national bibliography of the Deutsche Nationalbibliothek; detailed information can be found on the Internet at http://dnb.d-nb.

Contents

Preface

In today's globalized world, education and knowledge are seen not only as important for individual development, but also as a driver for economic growth, success and social stability of economies. In this context, the relevance of vocational training and further education is increasing. The vocational training market has been one of the world's fastest growing markets for years, which is also being driven forward by the liberalization of the markets in the education sector (trade agreement of the World Trade Organization (WTO) in the services sector. In this context, internationalization has become one of the most pressing issues in Technical and Vocational Education and Training (TVET). It represents the fundamental basis for a sustainably oriented education system. Not only the economic development of numerous developing and emerging countries, but also of countries with heavily school-based vocational training systems, shows increasing reform efforts because, among other things, growing qualification needs are not being met at the necessary high level. The employability of young people must be increased from a social and labour market perspective. At the same time, this makes a substantial contribution to the competitiveness of local companies in the target and partner countries.

The reform efforts described above are currently particularly noticeable in Georgia, which is in a state of upheaval that is accompanied by far-reaching economic and educational development.

The Otto von Guericke University Magdeburg supports Georgia's vocational training reform by gradually building up the capacities for vocational training research in Georgia at the interface between politics, business and educational institutions, based on academic expertise and many years of experience in international vocational training cooperation. By bringing together local universities with the Georgian Ministry of Education, economic actors and German TVET experts, substantial capacity building is being practiced, which not only has a sustainable but also multiplicative effect for all actors involved. The results flow into the iterative conception of the Graduate School and a doctoral program at the partner university in Tbilisi (Ivane Javakhishvili Tbilisi)

The book summarizes the scientific results of the project and connects this national perspective with international development trends in the development of the academization of TVET teaching staff.

First, Hennige, Bünning, and Grzelidze provide an overview of the Georgian education and vocational education and training system, including its latest developments, in order to foster a better understanding of and provide insight into the conditions in Georgia.

Thereafter, Spöttl elaborates on the necessary framework conditions for the establishment and successful implementation of TVET Research Institutions within an international context. The focus is primarily on conceptual and structural organizational

possibilities, while also addressing current and central issues concerning the development of vocational education systems.

The foundations and objectives of the bilateral German-Georgian research project VoCasian are thoroughly presented in the article by Martsch and Bünning. In addition to establishing a doctoral-level program, the project also aims to initiate a Graduate School. Many of the subsequent articles are based on the developments and successes of the project, making VoCasian the central "figure" of this anthology.

In this context, Brämer addresses two of the current international megatrends in vocational education: sustainability and digitalization, which are of essential importance for economic and societal changes and have become integral components in the education and training of (young) people.

Building on this, Hennige, Bünning, and Martsch provide a deeper insight into the design of the PhD program in Vocational Education, which was accredited and piloted as part of the VoCasian project. The study program is based on a comprehensive qualitative study, the results of which are also presented.

Subsequently, Böhner reflects on valuable practical experiences from the pilot phase of the PhD in Vocational Education, with a focus on research methodological training and the academic preparation of the first cohort of students. The author also connects this to the development of local research capacities and the promotion of data-driven vocational education policy.

Happ, Heidel, and Molina also report from practice, specifically addressing the content design of the modules, as well as specific content and particularities of teaching within the PhD program. This includes the teaching of typical research processes and tools, as well as the creation of a tailored learning environment.

In contrast, Tegelbeckers and Volkmann outline the fundamental prerequisites and goals for establishing a Graduate School. While the development of collaborative research structures will take time, several training courses and workshops have already been successfully implemented at the Georgian partner university.

Bünning, Spöttl, and Stolte focus intensively on the professionalization of vocational education in an international context and highlight the necessity of competence-based TVET teacher qualification. Through numerous country studies and system examples, special emphasis is placed on the dual approach of TVET pedagogy and specific technical knowledge, which is comprehensively explained.

Finally, Nepomyashcha, Lockau, Kanwal, and Kaur examine the transferability of the VoCasian project. The article investigates the potential of countries such as Kazakhstan, Uzbekistan, Pakistan, and India concerning their readiness for TVET developments, identifies existing and (potential) future structures and cooperation approaches, and provides an assessment of the success prospects of endeavors in the field of TVET research.

In line with the UNESCO standard usage, the term of Technical Vocational Education and Training (TVET) is mainly used in this publication. It should be noted here that in Georgia, TVET is known as Vocational Education and Training (VET) or Professional Education.

Status Quo of TVET System and TVET Strategy in Georgia

T. Hennige; F. Bünning; I. Grzelidze

Enhancing the education and science system of a country is essential to create an environment where social prosperity and economic growth can be achieved in the long-term. Georgia follows this approach and pursues the goal of increasing the quality of education and training to meet labor market requirements and support sustainable economic development. In addition to basic and higher education, technical and vocational education and training (TVET) plays a crucial role in Georgia's education system: TVET offers a cost-effective and efficient way to implement professional training that helps to reduce unemployment and social inequality and ensures decent working conditions in the labor market [1]. Therefore, the Georgian Government prioritizes vocational education and training by actively reforming and modernizing the system and aligning it with European respectively international TVET standards.

The following article provides a brief overview of the key educational structures and developments in the Georgian (vocational) education system, thereby offering all readers fundamental insights into the subject, which will be revisited throughout this book. It is based on comprehensive literature research and secondary data.

1 Educational pathways in Georgia

In order to better understand the situation and challenges within the Georgian (vocational) education landscape, it is first important to be familiar with the structure of the Georgian education system in general.

In Georgia, comprehensive preschool education is offered from a very early age, starting at 0 years. It is voluntary and accessible to every child of the corresponding age. Legislation mandates that preschool education in public institutions is free of charge, including not only educational but also nutritional services. In the preschool sector, children are supported from birth until the school entry age of six years whereby educational offerings are further divided into *early education*, *preschool education*, and the *school readiness program*.

During early education, from zero to two years, the focus lies primarily on caregiving services (health, nutrition, hygiene, and ensuring optimum child development). The preschool education phase, from two to six years, is characterized by the goal of promoting the holistic development of each child. In this course, a mandatory component of preschool is the school readiness program, which is developed based on the national educational standards for school readiness and aims to best prepare children for their entry into the general school system [2].

After the completion of preschool education, the general school education in Georgia also follows a three-tier structure, consisting of *elementary education*, *basic education*, and *secondary education*, with a total duration of 12 years. The general education system in Georgia is entirely state-funded. Each student receives a voucher equivalent to a financial standard to ensure that education is accessible to all. Every general education school adheres to a national curriculum developed by the National Curriculum Department of the *Ministry of Education and Science* (MoES).

The period of elementary or primary education comprises of six years (grades I – VI) and is mandatory for all students. Likewise, completion of grades VII – IX in basic education is compulsory, culminating in the awarding of a *Basic Education Certificate*. These certification exams are conducted by the National Assessment and Examination Center (NAEC). Students who successfully complete the intermediate level can continue their education in the secondary stage of the general education system or in the primary stage of vocational education (basic vocational education).

Grades X – XII constitute secondary education (ages approximately 16–18 years) and prepare students for higher education or secondary and higher vocational education. Upon completing secondary education, students receive a *Full General Education Certificate*, which also qualifies them for university admission [2].

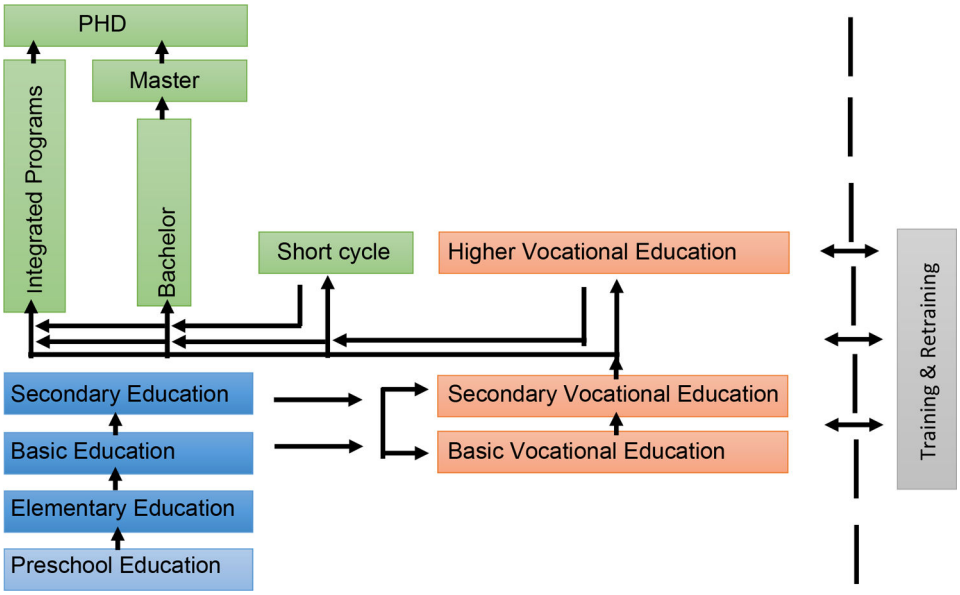


Figure 1: Georgian Education System (in accordance with NCEQE [2])

Vocational education in Georgia is offered in three ways and through various educational programs, whose structure and qualification characteristics are aligned with the (newly) developed *National Qualifications Framework* (NQF):

1. *Basic vocational education* is accessible to all those who can provide proof of a Basic Education Certificate. After completing a basic vocational education program, participants acquire a level 3 qualification as defined in the NQF.
2. A level 4 qualification according to NQF is awarded at the end of *secondary vocational education*. This requires either a Basic Education Certificate, in which the learning outcomes of the secondary level of general education are integrated, or a Full General Education Certificate from the applicant.
3. It is also possible to progress to *higher vocational education* via the Full General Education Certificate. Graduates receive proof of a level 5 qualification (NQF).

In addition to the regular TVET programs, there are special *training* and *retraining* programs whose defined learning outcomes can correspond to levels 2, 3, 4 or 5 of the NQF. They are geared towards the acquisition of specific competences for carrying out individual tasks in the same or a different field of work. Applicants who meet the requirements specified in the respective program are eligible to participate.

Institutions that offer TVET programs are, on the one hand, state and private TVET institutions (colleges) and, on the other hand, higher and general education institutions. The latter are entitled to offer various TVET programs without additional authorization. While general education institutions may implement basic and secondary TVET, national language, training and retraining programs, but no short cycle programs, higher education institutions may implement any type of vocational program (basic, secondary, short cycle or national language programs, furthermore vocational training and retraining).

Vocational colleges, however, must go through the process of authorisation by the *National Centre for Educational Quality Enhancement* (NCEQE) before they are allowed to offer one of the aforementioned programs. The authorisation process ensures that the necessary qualifications are in place to carry out the relevant activities and issue the state-recognised educational certificates [2].

The Georgian higher education system has a three-tier structure and offers academic education at Bachelor, Master and Doctoral level. The associated study programs are conducted by both public and private higher education institutions, whereby *Universities* are entitled to realise all three cycles of higher education (including research), *Teaching Universities* can offer Bachelor and Master programs (no doctoral programs) and *Colleges* only have Bachelor programs in their portfolio. Regulated degree programs as well as teacher training, language education and PhD programs require a separate accreditation procedure at all higher education institutions.

To facilitate the recognition and comparability of academic achievements, all institutions use the European Credit Transfer System (ESTC) [2].

Bachelor programs: Applicants who have a Full General Education Certificate (or equivalent) and have passed the *National Unified Exams* are eligible for admission to a university or Bachelor degree program. Bachelor programs comprise at least 240 ECTS.

Master programs: Master programs consist of at least 120 ECTS and are only open to Bachelor graduates (or equivalent). The *Unified Master's Exams* are a prerequisite for admission, whereby additional conditions can be set by the respective university.

Doctorate/PhD programs: Master graduates (or equivalent) have the opportunity to continue with a PhD program, which consists of at least 180 ECTS. The doctoral program duration is set at three years, the study component includes a maximum of 60 ECTS or less [2].

2 TVET policy developments and objectives

Low prestige, a lack of awareness among students, limited opportunities to learn certain professions, and a need to improve the system of professional respectively vocational qualifications and quality assurance are some of the reasons that have led to comprehensive reform approaches in the Georgian TVET system since 2007 [1]. The aim was (and still is) to adapt TVET structures to international standards as well as to increase the visibility and attractiveness of vocational education and training within Georgian society. In 2010, the development processes started with the introduction of the Framework for Quality Assurance in Vocational Education, the National Qualifications Framework and the Law on Quality Development (ibid.).

2013–2020 Vocational Educational and Training Development Strategy

These initial approaches were followed by the *2013–2020 VET Development Strategy of Georgia* supported by the EU, among others. The overarching goal of this reform approach manifests in the development and activation of national and individual human potential as a contribution to socio-economic development and poverty reduction in Georgia. Highly qualified skilled workers form the basis for meeting the short, medium and long-term needs of the economy. In addition, the corresponding development of professional education structures gives people from different social classes the opportunity to develop their individual talents within the framework of value creation. In terms of implementation, it is the aim to achieve enhanced financial access to TVET programs, furthermore to proceed with the implementation of competence-based and modular approaches, but also to promote work-based learning approaches as well as public-private partnerships [3].

Law on Vocational Education

The central *Law on Vocational Education* was adopted in 2018. It not only creates the legal basis for the Georgian TVET system, but also intends to align the NQF with the European Qualifications Framework (EQF) in order to ensure the compatibility and recognition of Georgian qualifications in Europe [4]. In addition to modernization approaches for the TVET structure based on international standards, the law also contains valuable system information for the training and professional development opportunities of TVET teachers (ibid.) Furthermore, it aims to support lifelong learning

and allows for flexible adaptations to labor market requirements. In the course of the Torino Process Assessment, the European Training Foundation (ETF) identifies five characteristics that particularly shape the Georgian education and training system [5]:

- A growing economy with competitive advantages particularly in tourism and transport, but limited creation of highly-skilled jobs
- A gradual improvement in labor market indicators, with rising employment, but modest use of human capital potential
- A noticeable degree of skills mismatch
- Problems in youth transition from education to work - those with a higher education find it easiest, but upper secondary TVET graduates also perform well
- Poverty and inequality for a considerable minority of the population, with signs of social inequality in educational achievement.

Not least to address these shortcomings in a more structured way, the MoES, together with the Georgian Chamber of Commerce, implemented the *Skills Agency of Georgia* in 2021 as a non-commercial, non-profit institutional model for TVET management [1]. By involving the private sector, the Skills Agency is tasked with the development of modern skills and the internationalization of the TVET system, while the MoES approves key measures and legal regulations, initiates the establishment of new TVET institutions and provides funding for existing institutions (ibid.)

The NCEQE and the NAEC are other relevant support bodies for the TVET system in Georgia. The NCEQE oversees quality assurance in TVET, the development of the National Qualifications Framework and the implementation of external quality assurance mechanisms [6]. The NAEC is responsible for the entrance examinations of vocational students and also conducts the Unified National Examinations (attestation tests) as well as a number of international exams [7].

Unified Strategy 2022–2030

Already in 2017, by introducing the *2017–2021 Education and Science Strategy* (building on the reform paper from 2013), the strategic measures in the TVET sector were expanded. Strategy targets included the integration of upper secondary education outcomes, (further) development of inclusive education, recognition of non-formal learning outcomes, and - most importantly- the unification of enrollment processes in educational institutions. Due to unsatisfactory evaluation results of these measures and the specific challenges revealed by the COVID-19 pandemic, the Government of Georgia developed the *2022–2030 Unified National Strategy of Education and Science in Georgia* in 2022, a long-term strategic plan. This strategy aims not only to further develop the (vocational) education system but also to advance scientific approaches. The intended goals focus on creating inclusive, diverse, and innovative learning environments, implementing exchange programs and joint projects with foreign institutions, and furthermore developing centers of excellence and international schools. The establishment of dual and modular program approaches remains just as important as the close

cooperation and the shared responsibility of the public and private sector in qualification development and sector-specific measures [8].

Assessment of developments

A comparison between the ambitious goals and the actual changes in the Georgian TVET system reveals initial successes. Noticeable achievements are for instance the modernization of numerous TVET institutions (in terms of equipment and infrastructure), the development of more than 150 vocational qualifications through public-private partnerships, the establishment of work-based learning approaches, and the implementation of 40 dual TVET programs. Furthermore and due to the integration of general education content into vocational education, students with a TVET qualification have the opportunity to continue their education at university level [9].

Despite many reform initiatives and promising prospects, vocational education remains a second choice for most young people: While the enrollment rate in higher education institutions more than doubled between 2012 and 2021, there is no significant increase in the number of students transitioning from general to the vocational education system (ibid.).

Economic stakeholders also show little confidence in the vocational qualifications of TVET students. There is a "mismatch between employers' and graduates' assessments of basic skills, with employers being more skeptical of the readiness of graduates for the workforce" [10, p. 12]. This discrepancy has a significant impact on the employability and career prospects of graduates and continues to hinder the attractiveness and reputation of vocational education programs in Georgian society.

3 Current state of research

The 2022–2030 Unified Strategy emphasizes not only the improvement of the education and vocational education system but also focuses on the further development of science in Georgia [8]. Indeed, a look at internationally recognized (English-language) publication lists reveals a significant underrepresentation of Georgian articles and studies. Vocational education research, in particular, is practically non-existent. Although the activities surrounding the Georgian government's reform and strategy plans have garnered attention, empirical approaches to accompany the development process are conspicuously absent. The few scientific articles published in the area of TVET in recent years rely on centrally collected data (e. g. from the National Statistics Office of Georgia (Geostat)) or evaluate the underlying documents of political reform efforts. In this regard, Darchashvili and Tskhovrebadze [11] discuss the various aspects and challenges of vocational education and teaching methods within Georgian vocational education practices. Giguashvili [1] conducts a critical analysis and assessment of the reform conditions and developments in the Georgian vocational education system over the past 10–15 years and offers initial recommendations for action.

Therefore, the 2022–2030 strategy paper sets the goal of promoting empirical research in general, initiating innovative research approaches, and striving for publications at regional, national, and international levels. In line with the internationalization strategy, cooperative research projects are increasingly supported [8].

4 Conclusion

The review data shows that Georgia is on the right track and all responsible bodies (ministry, implementing organizations) have provided valuable impetus, and respectively developed the foundations for sustainably transforming the (vocational) education and training system in the long-term. Although the overarching economic and social goals that are intended by the reforms in both the educational and vocational system have not yet been satisfactorily achieved, the political and institutional measures are beginning to bear fruit and offer great potential for shaping the societal as well as economic future. In addition to the growing demand for highly qualified TVET teachers, to the continuation of structural developments and a successful increase in the attractiveness of TVET programs among young people and applicants, TVET research moves into the center of attention. Experts are required who not only accompany and evaluate relevant development processes in Georgian TVET system, but also initiate and carry out scientific interventions, i. e. large-scale studies and measures that reform and advance the system from within.

References

[1] Giguashvili, G. (2023). Vocational education reform in Georgia: challenges and opportunities. International scientific journal «Grail of Science», 31, 68–74.
[2] National Center for Educational Quality Enhancement (2020). Education System. Online https://eqe.ge/en/page/parent/7/ganatlebis-sistema (Accessed: 18.06.2024).
[3] MoES (2013). Vocational Education and Training Development Strategy for 2013–2020. Tbilisi: MoES.
[4] Government of Georgia (2018). Law of Georgia on Vocational Education. Tbilisi: Legislative Herald of Georgia.
[5] ETF (2019). Torino Process 2018–2020 Georgia National Report. Turin: ETF.
[6] Tsiramua, K. (2021). National Center for Educational Quality Enhancement (Georgia). Online: https://www.ceenqa.org/wp-content/uploads/National-Center-for-Educa tional-Quality-Enhancement-Georgia.pdf (Accessed: 14.06.2024)
[7] MoES (n. d.). National Assessment and Examinations Center. Online: https://naec. news/international-exams/ (Accessed: 19.06.2024).
[8] MoES (2022). 2022–2030 Unified National Strategy of Education and Science of Georgia. Tbilisi: MoES.

[9] MoES (2023). 2022 Monitoring Report of the 2022–2024 Action Plan of the Unified National Strategy of Education and Science for 2022–2030. Tbilisi: MoES.
[10] ETF (2023). Torino Process System Monitoring Report: Georgia. Turin: ETF.
[11] Darchashvili, M., & Tskhovrebadze, T. (2022). Sustainable Development: Educational Initiatives for Well-Being (Vocational Education in Georgia). Journal of Development Studies, *3*(3), 42–49.

Setting up International TVET Research Institutions – Conceivable Approaches and Frameworks

G. Spöttl

The article examines the question of when it is appropriate to set up a research institute focused on vocational education and training and which content orientations are appropriate for this. It also reflects on the spectrum of core questions on vocational education and training that need to be covered to support developments in the establishment and expansion of vocational education and training systems and concepts. It will be discussed which organizational forms are possible, which implications are associated with each and which structural and personnel initiatives need to be taken to lead a research institute to success. In particular, the structural orientation and the organizational forms that are in question are critically examined and answers are sought to arrive at suggestions for the design of research institutes despite all the complexity.

1 Introduction

As for >TVET research, the question is highly relevant whether institutions are necessary for engaging in research work. To answer this question is not quite so easy. The reason for this is that there are numerous research activities in the social sciences, occupational sciences, educational sciences and engineering sciences that at least have an interface with vocational education and training or even conduct research in the fields of vocational education and training. This manifests the widespread understanding of vocational education as a "sub-discipline of educational science" [10] which (rather selectively) deals scientifically with "the prerequisites and conditions, goals, possibilities and realities of qualification and competence acquisition processes for humane gainful employment and for a life in society in social and ecological responsibility". [10, 11] The understanding of vocational education as a sub-discipline of educational science inevitably leaves open fields of research that can be covered by other disciplines. This fact alone suggests that the question of whether research facilities or research institutes should be established that conduct TVET research both nationally and internationally to cover TVET as a whole requires investigation. This question is the focus of this article.

2 Requirements for Research in TVET

With regard to the question raised above concerning the classification of TVET research, Lipsmeier [10] assumes that "an extended concept of research should be taken as a basis, which includes the systematization of existing knowledge using relevant and transparent categories, principles and hypotheses". Theoretical reflection on vocational education and training, the analysis of empirical data, the expansion of knowledge through suitable research methods in studies of vocational education and training practice and the world of work while adhering to scientific standards and quality criteria (objectivity, validity, reliability, representativeness and generalizability) as well as the verifiability of results are important components of vocational education and training research, but exclude – according to [10] – the examination of historical writings, educational policy conceptualizations, praxological developments and the like, because they are not the result of research. In this regard, it should be noted that exactly how individual writings and documents are to be classified and the decision on what relevance they actually have in the context of selected research questions must be examined on a case-by-case basis. In TVET research, document analysis plays an important role in the investigation and sectors [1] in classifying the significance of sectors in the overall context. For example, economic policy assessments are relevant in such cases, whereby the documents to be analyzed in many cases do not result from research work but were formulated on the basis of association policy interests. The associated assessments, evaluations or demands for the development of sectors are certainly important for research work, but their degree of obejectivity must be examined. For research in vocational education and training, it is important to clearly identify the research fields to be able to identify relevant research objects. [4, 22] With the help of research fields, the heterogeneity of the structures of the world of work on which TVET research is focused can be clearly identified. The following five fields outline the focal points of TVET research (Figure 1), which can generally be explored by using different methods. The fields in detail [6, 8, 13]:

- Field 1: Cooperation with industry
- Field 2: Institutional structure of a vocational education system
- Field 3: Definition of level structures and certificates in educational fields
- Field 4: Curriculum development according to consensus principles with work relations
- Field 5: World of work, work processes as connecting dimensions, social and legal dimensions.

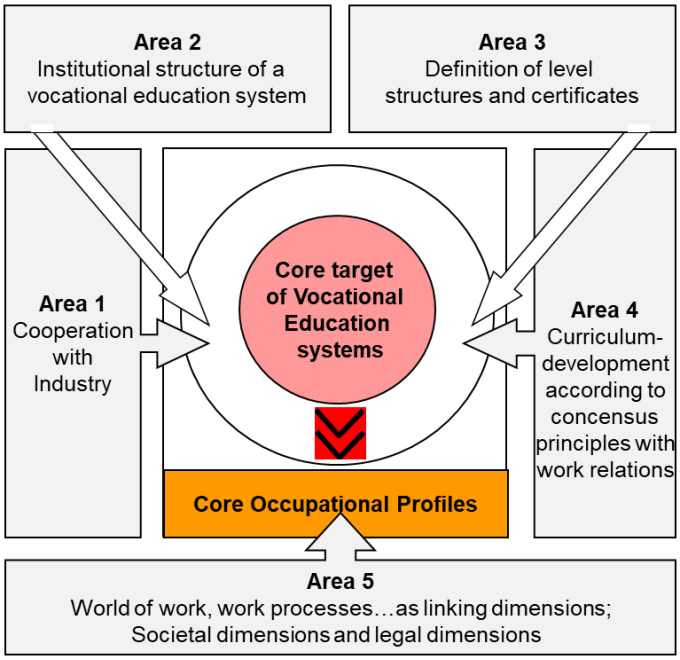


Figure 1: Core areas of TVET-Research (Technical Vocational Education and Training)

These five fields define the core of TVET research and pursue the goal of identifying which requirements from the development of the world of work and society are important and how to respond to them in education and competence development processes or, better still, how learning should be designed in order to find the best answers for the various social situations and the needs of the labor market. Countries with vocational education and training systems such as Germany, Switzerland or Austria design occupational profiles as the foundation for initial vocational training, which represent the link between labor market requirements, societal demands and the competence development in the individual [6]. Ideally, occupational profiles are developed by means of empirical research and then form the basis for clarifying the questions of the five core fields. A selection of questions is discussed below.

Field 1 focuses on the cooperative relationship between the company and school as learning venues, insofar as training and learning take place through cooperation between these two learning venues. In the case of purely school-based training, the clarification of cooperation can focus on the interaction between laboratory exercises and theoretical lessons, on skills assessment in different forms of learning or forms of cooperation between the school-based learning locations. Other questions are also possible.

Research Field 2 deals with very fundamental questions regarding the institutional design of formal vocational training. The decisive factor here is to design structures that create the conditions for training according to educational policy and labor

market interests and needs. In this case, research can help to determine how a certain level of training can be ensured, which institutional structures promise optimal solutions, which training profiles should be pursued and how the desired quality can be ensured.

Research field 3 must correspond closely with research field 2, because the focus there is on the question of the concretization of qualifications and qualification profiles. Which structures the vocational education system should have will be answered in the joint processing of research fields 2 and 3.

Research field 4 deals with the fundamental question of curriculum design, the prioritization of different design principles and the question of work process references and the safeguarding of the promotion of education with the help of curricular content and structures. Training and further education focuses, profiles of training and further education, structural issues and level issues also need to be clarified.

Research field 5 focuses on social and legal issues relating to values, work processes and the world of work. Here it is determined that vocational education and training not only pursues the training and execution of skills, but also answers important questions about societal and social development. It is also about a thorough clarification of the relationship between education, qualification, shaping and adapting with reference to values and the development of society and the labor market.

The five core fields of technical vocational education and training in which research should be conducted are influenced by numerous factors that must be taken into account in research work. Scientific research that pursues the five core fields must also take into account the parameters described by the acronym VUCA (see Figure 2):

- Volatility (V)
- Uncertainty (U)
- Complexity (C)
- Ambiguity (A).

These terms symbolically refer to the change in knowledge, work and communication processes. The dynamic processes and challenges that are taking place "are faced by individuals and their coexistence, but also by the labor market and educational institutions." [5] According to Lévesque [9], volatility describes transience. New technologies, ideas or adaptations often undergo rapid innovation processes, so that familiar stabilities and routines are frequently overturned. This is associated with great uncertainty, because planning security is taken away and dealing with what cannot be planned becomes central. Complexity is constantly increasing. "Work and business processes are becoming more digital, more networked and more dynamic. Social contexts are becoming more difficult to penetrate and it is often only possible to clarify connections between cause and effect in retrospect." [5]

Finally, increasing ambiguity presents individuals with major challenges, as the common (knowledge) canon is becoming less and less reliable. The environment in which we live and work is changing rapidly, dynamically and often fundamentally. [18]

This so-called VUCA world needs to be explored to prepare learners for participation in this world. Research field 4 is particularly challenged here because curricular questions and questions of relevant qualification profiles need to be clarified. Whether a reorientation of teaching and learning concepts is necessary, as stated by Gitter [5], is a question that still needs to be clarified.

Other key areas relevant to research are

- equity and equitable opportunities
- diversity
- inclusion
- ability
- belongings
- resilience
- sustainability
- transformation of society (cf. Figure 2).

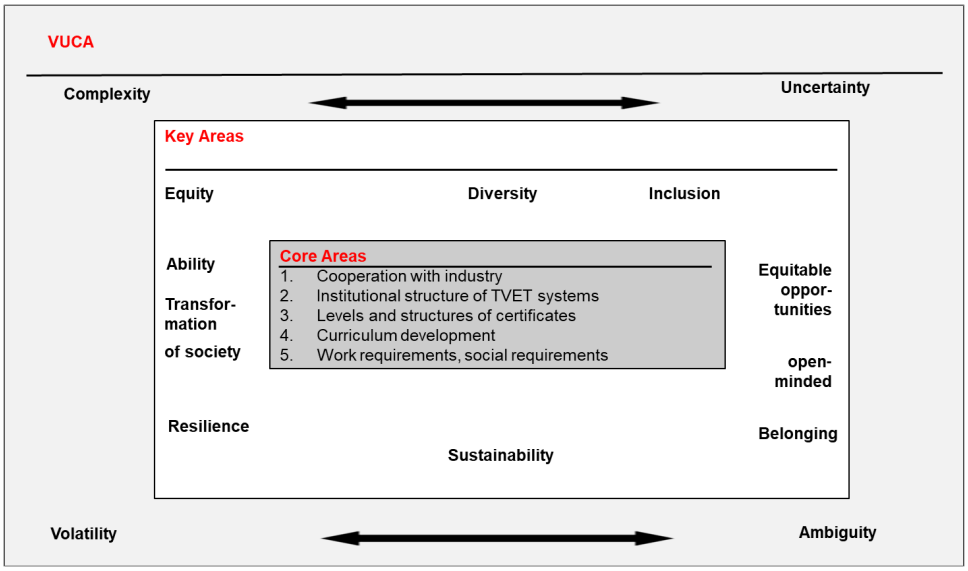


Figure 2: Expansion of the core areas of TVET research

Diversity, **E**quity, **I**nclusion and **B**elonging [DEIB] are key pillars in formal and informal vocational education and training. However, although vocational educational institutions around the globe aim to ensure future citizens equitable opportunities to live in a more resilient, open-minded, inclusive, and democratic world, some of those institutions are too often inequitable and selective, which has direct repercussions for their ability to transform society.

Even if the core fields of technical vocational education and training to be researched are discussed here first and foremost, it is clear that the study of vocational education and training that only prepares students to master technical subject compe-

tences falls short. Challenges resulting from social developments should have been addressed a long time ago and become the subject of research, teaching and learning. In these cases, the task of research is to clarify the fundamental structures of the various developments in the individual fields of vocational education and training and to prepare them for vocational learning.

The above outline of challenges underlines the need to work with a broad understanding of research in order to break down the diverse changes and question their significance for vocational education and training as well as the competence developments taking place there. As for research work, it is important to note that the reference to the core fields of vocational education and training are maintained, *which means that extended vocational education and training and vocational pedagogy research take place that do not only consider itself as a sub-discipline of educational science and vocational education and training.*[1]

3 Institutionalization of vocational education and training research

In many countries, vocational education and training is still accompanied by fragmented research. In quite a few countries, there is no targeted research focused on vocational education and training. [16] Teichler already noted three decades ago that qualifications research (for Teichler, the core of TVET research) was in crisis. He attributed this to the fact that this research is not an established field of research with usually permanent institutionalization, but a complex of topics that is represented in many areas as a focal topic. [19] In Teichler's opinion, vocational education and training research is not an established field of research with usually permanent institutionalization. [9] this is also the reason why various academic disciplines such as educational science, educational research, curriculum research, educational sociology, psychology, sociology and other disciplines conduct qualifications research. Rauner [15] argues in a similar way, seeing vocational education and training research as being institutionally integrated in different ways. He speaks of occupational and qualification research with a work-science/-psychological focus, training regulation research, occupational and qualification research and industry-sociology research. The different institutional anchoring of research inevitably results in fragmented research. [17] In order to prevent this situation, research in and for TVET must be anchored in TVET. This project requires an institution that is geared towards TVET research. The content orientation of this research includes the connection between

- work and the associated requirements for employability,
- occupationally relevant personality traits and
- the content and processes of learning.

1 The author uses the term 'vocational research' for a more detailed approach to VET research. However, the general term 'VET research' is preferred in the article due to the objective.

Vocational education and training research not only includes qualification research – see Chapter 2 – but also spans an arc from work and the implications contained therein, such as customer requirements, society and legal requirements, company performance requirements, work organization, industrial and skilled manual work, the development of curricula and the design of learning processes. Industrial and cultural circumstances, ecological challenges, special features of production methods and social conditions such as educational requirements must be reflected and taken into account.

Dealing with work, more specifically with skilled work, is a core element of research work in vocational education and training. This ensures a connection to reality, which is not insignificant for the education of the subject. [12] Dealing with the challenges of the world of work is also important because this is the only way to differentiate between education and employment systems and other factors. Other factors include the tension between educational interests and the interests of "real society", which manifests itself in the need to overcome the old logics of a solely purpose-oriented vocational education. The reason for this is that, on the one hand, education is fundamentally different from qualification, but at the same time they are constitutive of each other, because education that does not qualify practically loses its (subjective) personality-enhancing significance. Vocational education and training research therefore concentrates on the examination of work processes and their holistic dimensions which need to be opened up in terms of vocational training theory.

The studies required for this [1] offer starting points for the complex of investigations outlined due to a differentiated set of research instruments. The "identification of ambivalences" in the sense of the educational theory considerations of Huisinga and Buchmann [2, 7] also aims not to stop at the identification of purposive connections, but to break down all implications as far as possible. They justify this necessity as follows: "The current social structures for vocational work processes are characterized as such in the modern age by ambivalences and uncertainties as well as by complexity, individualization and rationalization, to name just a few aspects that are central to the relationship between education and employment systems and the questions of fit." [7]

The research perspectives outlined with a central focus on the integration of work, technology, social, cultural and ecological dimensions as well as vocational education and training provide sufficient indicators for the establishment of independent research facilities or research institutions. [3] This is also necessary because the subjects of TVET-related research are very diverse and research in the fields of occupational science, scientific psychology, industrial sociology, sociology or educational science can only take partial aspects into account. However, this also means that TVET research should not operate in isolation from other disciplines, as research methods and research instruments can be helpfully borrowed.

4 Organization of internationally oriented TVET-Research Institute

4.1 Diversity of Research Organizations

In Chapters 2 and 3, a possible research profile for research institutions in vocational education and training is outlined. According to this, the core of research is to investigate how social conditions and the world of work, and its conditions are changing and what consequences this has for qualification requirements and competence development in order to be able to shape and manage society and work processes. The influence of social changes and attitudes, personal orientations and ecological challenges must also be examined. [20]

The question of whether vocational education and training research should be established in a specific institution allows for a variety of answers. If one analyses how solutions are organized and configured in countries that have established both TVET and TVET-related research, numerous variants can be identified that can be summarized in the term "institutional-organizational diversity". The following university institutes can be identified:

- university institutes or research groups at universities that pursue various focal points,
- private, non-university research institutions that conduct research on specific topics,
- governmental or semi-governmental research institutions that conduct research on specific topics,
- research agencies that combine questions regarding vocational education with societal questions are applied by different operators,
- regional research institutions with very differentiated priorities

to name just a few of the most important institutes.

Pioneering steps towards the establishment of TVET research were taken in the past with the founding of state research institutes, among others: private, extra-university research facilities that conduct research on various research issues.

Pioneering steps towards the establishment of vocational training research were taken in the past with the founding of state research institutions, among others:

Country related (government supported):

- BIBB (1970): Federal Institute for Vocational Education and Training (former organization: Federal Institute for Vocational Education and Training Research)
- Céreq (1970): French Centre des études et des recherche sur les qualifications
- USSR (1963): All Union Institute for Technical and Vocational Education of the USSR in Leningrad

- NCRVE (1965): Centre for Research and Leadership in Vocational Technical Education (in 1977 promoted to the status of a National Research Center)
- MyRIVET (2018): Malaysia Research Institute for Vocational Education and Training

International (government supported):

- UNESCO-UNEVOC (2000): UNESCO International Centre for Technical and Vocational Education and Training
- CEDEFOP (1975): European Centre for the Development of Vocational Training

Other Players (community initiatives)

- Research networks, e. g. RAVTE, EERA, VETNET, ABGFN ...

The respective national and international interest in TVET research is reduced by the interlinking of TVET with both education and economic and labor market policy. Due to the transnational interdependence of markets and societies, it was obvious that vocational education and training should not only be pursued nationally but should also cooperate internationally.

A look at the respective agendas of individual research institutions quickly reveals that the focus and level of research varies greatly. It becomes clear that TVET research is interdisciplinary. The breadth of topics requires the involvement of subjects such as psychology, sociology, natural and engineering sciences, education and economics and educational sciences. Not only is there a large number of subjects involved, but also a vertical structure with macro, meso and micro levels, including a special level for specific TVET issues (see Table 1).

Table 1: High variety of research questions and development tasks

Level of research	Main topics of research
Macro	Organization and design of TVET programs and institutions.
Meso	Analysis and shaping of education and learning processes and TVET study programs.
Micro	Integration of different scientific disciplines and research traditions to support learning and teaching.
Specific TVET topics	Organized in an interdisciplinary way – participation of disciplines like psychology, industrial sociology, engineering, pedagogy and others to shape TVET profiles and TVET programmes.

At the macro level, the focus is on the investigation of TVET systems, at the meso level TVET and study programs dominate, whereas the micro level is concerned with the successful design of learning and teaching, whereby various disciplines are included here. In TVET, however, there are further, very specific tasks such as the design of TVET profiles or occupational profiles, for which separate cognitive processes must be organized. This also applies to the design of vocational training plans, training meth-

ods, training media, the design of curricula, the design of media and the design of training units. [22]

TVET research deals with a wide range of complex research fields and subjects, which is very time-consuming for the practical realization of research. This requires original research methods and instruments, including the integration of expertise from neighboring sciences. A special feature of vocational education and training is that different countries, even if they are comparable in terms of economic structures, have produced very different vocational education and training systems, which is due to the cultural characteristics of the nation states. This situation has significant consequences for research and the establishment and organization of TVET research institutes. [14]

4.2 Setting up a Research Institute

As described above, the establishment of research institutions or a research institute is associated with very different challenges. In addition to the scientific-theoretical foundation, the first step is to clarify some fundamental questions such as

1. How can research contribute to the development of a "national TVET system"?
2. How can research in TVET properly reflect a country related diversity of TVET systems?
3. What are the consequences of diversity in TVET as well as in the framing of research issues and in the use of research methodologies and tools?
4. Identifying the demand of human resources on a high-quality level for different sectors of the industry.
5. Development of recommendations regarding future perspectives of human resources development.
6. The importance of research in technical education and vocational training is a "subject in its own rights".

Once these questions have been clarified in connection with the orientation of the research institute, the next priority on the agenda is to determine which research priorities should be addressed. In order to avoid external control, the following points need to be clarified:

1. Objects of investigation
2. Questions, questions, questions ...of research
3. Hypotheses, hypotheses ...of research
4. Methods for research
5. Instruments for research
6. Theories for an own discipline
7. Links to other disciplines ("families")
8. Research outcomes (expected)
9. Links to society, politics, social partners
10. Placed at Universities...

The answers to points 1–10 are the basis – next to theoretical issues – for defining a research profile for the institute currently being planned. Even if not all questions have been conclusively answered with the start of the work, the answers provide a direction. Once the institute has been founded, further answers can be successively developed, and the institute's prospects can be reviewed. This applies in particular to the theoretical foundation of the institute.

In addition to the theoretical framework, it is of great importance that researchers are selected who are able to work on key research areas in line with the institute's requirements. The following must therefore be answered with regard to the researchers:

- Which talents do they have to bring along?
- How do they have to be qualified?
- How should they have to work? Which frame do they need?

This becomes another important field, namely the infrastructure and the organizational form of the institute. Answers to these questions need to be clarified in another important field, namely the infrastructure and the form of organization of the institute. The following questions must be answered:

- What kind of organization is the best?
- What for the researchers should be responsible?
- What about availability of researchers?
- How are the research rules and others?

Further questions will need to be answered during the establishment process. It is important that convincing answers are found in relation to the respective situation.

4.3 Organization of a Research Institute

It has already been explained in the previous sections that numerous different variants for the structure of research institutes are possible. In the following, two real-life organizational approaches which differ in the way they assume responsibility for research are presented. [21, 24]

The institute in Figure 3 is a TVET research institute that is based at a university but operates completely independently in terms of its research profile, the organization of research and responsibility for research results. The Council decides on the organizational structure, research priorities and administrative work, and the Management Board implements the decisions. The representatives of the Management Board are also members of the Council. Other members of the Council are researchers at the institute and administrative staff. An Advisory Board, which is made up of independent researchers, regularly analyzes the institute's work and provides feedback on possible corrections to research priorities, research objectives, possible collaborations, departmental staffing and possible funding platforms. The Advisory Board also reports to the university management on the development of the institute and makes suggestions for specific focal points for further development.[2]

2 Institutes with this form of organization are for example located at Europa Universität Flensburg and Universität Bremen.

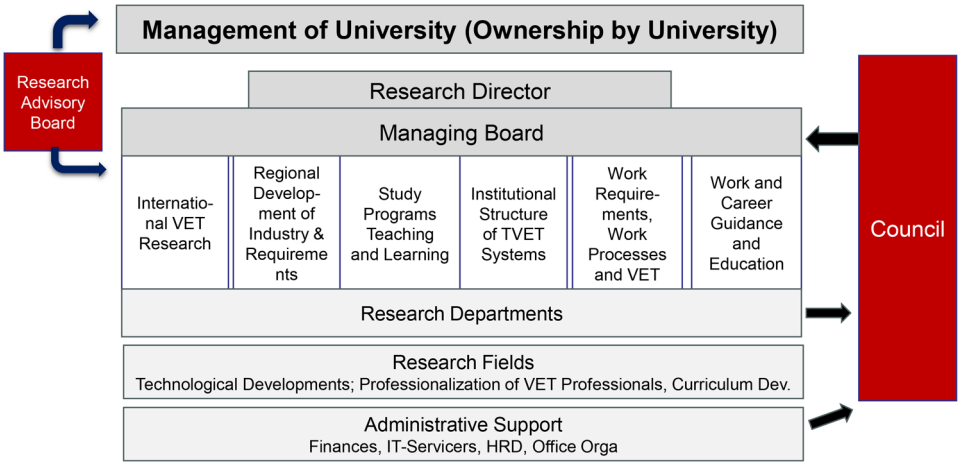


Figure 3: Independently operating research institute (Ownership: University)

Research is financed through funds raised for research funding. These can come from state or private funding channels and tenders. If such a research institute is based at a university, the research directors take on a dual role. On the one hand, they are responsible for the organization of study courses and teaching in selected subject areas, and, on the other hand, they act as department heads at the research institute to carry out research tasks. This dual role of the research directors ensures a close link between research and teaching and ensures that research results are incorporated into teaching, generating impulses for research for teaching or that research projects are applied for that provide support for teaching.

The linking of the research institute and teaching at a university does not lead to the university management interfering in research or the research institute. The institute remains independent in its actions and decisions, even if ownership lies with the university.

A different form of organization and responsibility exists when a research institute is under the responsibility of a ministry (Figure 4). In such a case, the objects of research are primarily shaped by political decisions. This is also the case if the institute's management (directors, deputy directors, administration) and board of directors are elected by academic bodies. In this constellation, ownership of institutes is generally in the hands of the Ministry of Education, which is able to issue directives and set research priorities through funding. Although a Board of Directors can influence the framework for carrying out research work, it cannot demand fundamental research priorities if these are not desired by the Ministry. An advisory board, on the other hand, is forced to refer to an existing framework in terms of content and structures without being able to make fundamental proposals. With this form of organization, it can be assumed that proposals for optimizing the upcoming research work will not be made.

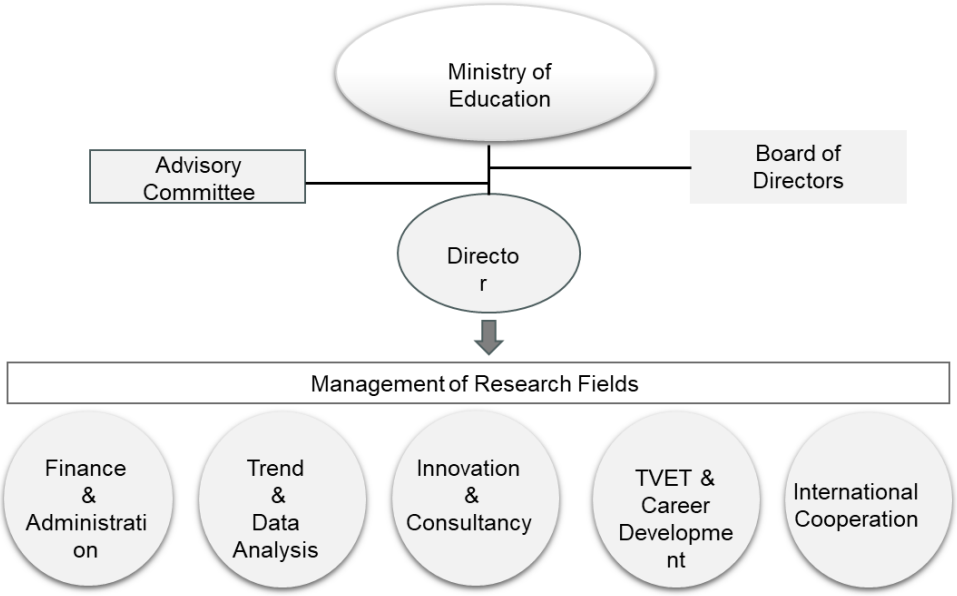


Figure 4: Centrally managed research institute (Ownership: Ministry)

State-supported research institutions usually have a clear top-down organizational structure. Figure 4 shows such an organizational form. These structures can certainly help to promote the efficiency of day-to-day work, but whether they support the high degree of variability required in research and the introduction of new ideas is another question.

The research fields shown in Figure 4 are taken from MyRIVET (Malaysia Research Institute for Vocational Education and Training). It is not clear from the names of the fields whether they explicitly refer to TVET. In any case, this reference must be clarified by the objectives of an institute.

A research institute set up in this way can be located at a university, but other local assignments such as a location in a ministry are also possible in such cases. The decisions have to be made by the responsible actors themselves. The decision-making process itself is likely to be influenced by numerous interests.

5 Initiatives for setting up research institutes

There are several ways to take the first steps towards establishing a research institute. First of all, the potential stakeholders must clarify whether and why an independent research institute for TVET should be established. This is important because universities in particular have the opportunity to initiate and run research groups at or within faculties very easily. There must therefore be solid reasons why an independent TVET research institute can make an innovative contribution to the safeguarding and further

development of vocational education and training. Such institutes often emerge as a spin-off from existing ones in order to work on issues that are not being pursued at the established institutes. In other cases, diverging interests lead to the establishment of new institutes. A further challenge in establishing a research institute arises when vocational education and training is to be more systematically pursued and supported in a country than in the past. In such cases, data, concepts and proposals are required, as well as the clarification of fundamental questions. Research institutes, which can be set up by interested parties as private institutions, are suitable for this purpose, or they can be set up at universities if other approaches (semi-public institute, foundation institute) are not likely to be pursued. When setting up research institutions, it is important that clarity is created from the outset about the research objectives, the research focus and the research subjects, and that a decision is made about the organizational form and the allocation of the research institute so that interested parties can adapt to this. Another important point is that reliable sources of funding are found to secure the research work in the long term.

6 Summary

The above statements underline that the foundation and establishment of a TVET research institute is in principle possible but is influenced by a number of factors. An important point is to first clarify why an institute is to be founded and which orientation or focus should be pursued. There must be a need for TVET research in a country or region, which presupposes that VET plays a role and that there are unresolved issues. Potential supporters should always be recruited.

Other important clarification concerns the research fields to be pursued, which must be suitably defined to achieve the objectives of the research work. Clarification of the use of certain research methods and instruments is also relevant. When clarifying the research fields, actors and stakeholders in vocational education and training from the regional and/or supra-regional environment should always be involved.

Another very important point is to determine the organizational form of an institute. Should it be a top-down or bottom-up organized institute or should a solution be found between the two poles. It also needs to be clarified whether it should be a private institute or a state-run one, or whether it should be sponsored by a foundation or another organization.

There are therefore several questions that need to be answered when setting up a TVET research institute. The most important thing is that if there is a need for TVET research, it is highly recommended to establish a research institute that conducts TVET research under its own responsibility, because this is an important prerequisite for obtaining balanced answers to relevant questions. Research institutes can always provide important data, concepts, ideas and other tools to successfully support TVET.

References

[1] Becker, M. & Spöttl, G. (2015). Berufswissenschaftliche Forschung. Peter Lang.
[2] Buchmann, U. (2005). Case Management im Fokus bildungswissenschaftlicher Qualifikationsforschung. In: Huisinga, R. (Ed.), Bildungswissenschaftliche Qualifikationsforschung im Vergleich. pp. 111–138). G. A. F.B.-Verlag.
[3] Dietzen, A. & Kuhn, M. (1998) (Eds.), Building a European Co-operative Reserach Tradition in Vocational Education and Training. The contribution of the LEONARDO DA VINCI Programme's surveys and analyses. Bonn: Bundesinstitut für Berufsbildung.
[4] Fretwell, D. H.; Lewis, M. V. & Deij, A. (2001). A Framework for Defining and Assessing Occupational and Training Standards in Developing Countries. Information Series No. 386. World Bank: The Ohio State University.
[5] Gitter, M. (2024). Digital agile Lehr-Lernsettings in Berufsfeldern – Eine Perspektive aus der Ernährung und Hauswirtschaft. In: Spöttl, G. & Tärre, M. (Eds..), Didaktiken der beruflichen und akademischen Aus- und Weiterbildung. Springer (im Druck).
[6] Grottker, D. (2018). Berufsbildungsforschung in der DDR. In: Rauner, F. & Grollmann, Ph. (Eds.), Handbuch Berufsbildungsforschung. pp. 43–52). wbv Media GmbH.
[7] Huisinga, R. & Buchmann, U. (2006). Zur empirischen Begründbarkeit von Lernfeldern und zur gesellschaftlichen Vermittlungsfunktion von Lehrplänen. In: Pätzold, G. & Rauner, F. (Eds.), Qualifikationsforschung und Curriculumentwicklung. pp. 199–220). ZBW.
[8] Kruse, w. & Paul-Kohlhoff, A. (2018). Berufsbildungsforschung im Spannungsfeld zwischen Berufsbildungspolitik, Berufsbildungsplanung und Berufsbildungspraxis. Einführung. In: Rauner, F. & Grollmann, Ph. (Eds.), Handbuch Berufsbildungsforschung. pp. 63–66). wbv Media GmbH.
[9] Lévesque, V. (2020): Agilität, Welt und Bildung: Von Wurzeln, Definitionen und Zusammenhängen zu Spielfeldern, Handlungsoptionen und Grenzen. In: Kantereit, T.; Arn, Ch.; Bayer, H.; Lévesque, V. & MacKevett, D. (Eds.), Agilität und Bildung. Ein Reiseführer durch die Welt der Agilität. Verfügbar unter: https://media4schools.de/wp-content/uploads/2021/02/Agilita%CC%88t-und-Bildung-book-sprint.pdf. 16.09.2023.
[10] Lipsmeier, A. (2018). Genese der berufspädagogischen Forschung. In: Rauner, F. & Grollmann, Ph. (Eds.), Handbuch Berufsbildungsforschung. (pp.25–33). wbv Media GmbH.
[11] Mazzocchi, F. (2019). Scientific research across and beyond disciplines: Challenges and opportunities of interdisciplinarity. EMBO Rep. 2019 Jun; Volume 20, Issue 6, e47682.
[12] Mustafa, H., Hussain, M. A. M., & Zulkifli, R. M. (2022). Industries and Vocational Training Centres Partnership: Issues and Improvement Plan. International Journal of Academic Research in Progressive Education and Development, Volume 11, Issue 1, p. 134–144.

[13] Pahl, J.-P. (2018). Zur Genese berufswissenschaftlicher und berufsdidaktischer Forschung. In: Rauner, F. & Grollmann, Ph. (Eds.), Handbuch Berufsbildungsforschung. pp. 34–42). wbv Media GmbH.
[14] Pereira, V.; Hadjielias, E.; Christofi, M.& Vrontis, D. (2023). A systematic literature review on the impact of artificial intelligence on workplace outcomes: A multi-process perspective. Human Resource Management Review. Volume 33, Issue 1, 100857.
[15] Rauner, F. (2018). Berufsforschung: Formen und Richtungen der Berufsforschung. In: Rauner, F. & Grollmann, Ph. (Eds.). Handbuch Berufsbildungsforschung. Bielefeld: wbv Media GmbH, S. 129–137.
[16] Spöttl, G. (2002): Work Process Orientation of the TVET System and Consequences for Occupational Standards. Flensburg: biat, Heft 11.
[17] Spöttl, G. (2008). Arbeitsprozessbezogene Forschung und deren Methoden. In: Fischer, M. & Spöttl, G. (Eds.), Forschungsperspektiven in Facharbeit und Berufsbildung. pp. 156–183). Peter Lang.
[18] Spöttl, G. & Becker; M. (2006). Arbeitsprozessanalysen – Ein unverzichtbares Instrument für die Qualifikations- und Curriculumforschung. In: Huisinga, R. (Ed.), Bildungswissenschaftliche Qualifikationsforschung im Vergleich. pp. 111–138). G. A. F.B.-Verlag.
[19] Teichler, U. (1995). Qualifikationsforschung. In: Arnold, R. & Lipsmeier, A. (Eds.), Handbuch der Berufsbildung. pp. 501–508). Leske und Budrich.
[20] Thole, C. (2024). Grenzen einer arbeits- und geschäftsprozessorientierten Berufsbildungsdidaktik vor dem Hintergrund der Veränderungen in der Arbeitswelt: Skizze einer Berufsbildungsdidaktik 4.0. bwp@ Berufs- und Wirtschaftspädagogik – online, 45, pp. 1–35. https://www.bwpat.de/ausgabe45/thole_bwpat45.pdf. 02–07.2024.
[21] Research Institutions 2024: Heidelberg University. https://www.uni-heidelberg.de/en/institutions/research-institutions.
[22] Windelband, L. & Spöttl, G. (2004). Research Handbook – Instruments for Early Recognitions of Qualification Needs. Paper 1. biat.
[23] Schwab, K. (2016). The Fourth Industrial Revolution. Crown Business.
[24] University of Cologne 2024. Research Institute for Vocational Education and Training in the Crafts Sector (FBH). https://wiso.uni-koeln.de/en/research/affiliated-institutes/fbh-research-institute-for-vocational-education-and-training.

VoCasian – A framework for TVET PhD programs in Georgia

M. Martsch, F. Bünning

In the age of globalization, education is the key to sustainable economic growth and societal participation. In this context, the importance of Technical Vocational Education and Training (TVET) is also increasing. The dual system and the academic training of teachers are the main pillars of the German TVET system, which is highly valued and recognized internationally. The demand-driven and practice-oriented training serves as a beacon for many countries in modernizing their national TVET systems. Such reform efforts are particularly evident in Georgia, whose deteriorating educational structures can no longer keep pace with the growing need for qualifications. There is a particular lack of forward-looking, sustainable concepts for the professionalization of teaching staff, which forms the foundation of high-quality vocational education and training. Past programs for the export of TVET have shown that individual elements, concepts, or system components of foreign education systems cannot be directly transferred to other countries. Instead, they must harmonize with the educational, economic, and social framework conditions and goals of the recipient states. Putting this into consideration, a bottom-up approach to support the Georgian TVET reform is presented, which leverages the potential of the German-Georgian TVET partnership through the active involvement of both alliance partners. The goal of this bilateral cooperation is embodied in the empirically supported and iterative design of a doctoral program aimed at enhancing the qualification of Georgian TVET personnel.

1 Introduction

In today's globalized world, education and knowledge are not only crucial for individual development but also serve as drivers of economic growth, success, and the social stability of economies [1]. Systematic vocational education forms the fundamental basis for sustainable education systems and qualification concepts that are subject to high volatility worldwide. In this context, the development of the TVET sector is particularly important. Consequently, the TVET market has been one of the fastest-growing global markets for years, driven also by the liberalization of educational markets within the framework of the General Agreement on Trade in Services [2, 3]. Similarly, the internationalization of vocational education (i. e., diverse international Vocational Education Cooperation; VEC) has become one of the most pressing topics and research areas for German TVET stakeholders. In this context, support is provided for the emerging reform efforts of developing and emerging countries, as well as countries with predominantly school-based TVET systems, which can no longer meet the growing qualifica-

tion needs at the required level and/or must urgently enhance the employability of young people from social and labor market policy perspectives.

Currently, such reform efforts are particularly evident in Georgia. The country is undergoing a transformation accompanied by significant economic and educational developments [4]. To sustainably improve the quality of regional products and services, the Ministry of Education and Science Georgia (MOES) calls for the strengthening and expansion of the vocational education sector [5]. Specifically, three overarching goals are pursued: a) developing an innovative and flexible vocational education system focused on the needs of society and the economy, b) ensuring accessibility to diverse, inclusive, and individual need-based vocational education, and c) enhancing the efficiency of the vocational education system [5]. In the corresponding strategy paper for the development of vocational education for the period 2013–2020 [4, cf. also "Status Quo of TVET System and TVET Strategy in Georgia" in this publication for details], the need for the development and presentation of a standard for workplace trainers and the introduction of academic training for vocational educators is emphasized. MOES [4] views this as the initial reform step towards a sustainable and dual-oriented Georgian vocational education. Additionally, the implementation of the educational reform aims to make the training of professionals as practice and work-process oriented as possible while at the same time ensuring alignment with international standards. The associated systemic changes and challenges are to be addressed with German support and with the German TVET system in mind, as the dual system is regarded as exemplary, regardless of the focus or field of study. This quality image is based on the imparting of solid, practice-oriented expertise grounded in empirically proven teaching and learning methods, as well as the corresponding (subject-specific) didactics [6], earning German vocational education the highest recognition and appreciation internationally, including in Georgia [7, 8]. The same applies to the accompanying quality management [9], the continuous scientific support of vocational education, and especially the professionalization of teachers [10]. As a result, German vocational education ensures a qualified skilled workforce for the labor market, characterized by high levels of technical, methodological, and social competence, which coincides with increased employability. Therefore it is not only a central factor for economic competitiveness but also contributes to comparatively low youth unemployment and short transition periods between the end of schooling and the start of a career [11].

VoCasian addresses the needs and demands of the described reform steps in the Georgian vocational education reform and aligns with the strategy paper of the German Federal Government on vocational education cooperation from a single source [12]. The latter outlines five core elements (I. Cooperation between the state and the economy, II. Learning in the work process, III. Societal acceptance of standards, IV. Qualification of vocational education personnel, and V. Institutionalized research and consultation), which consolidate important quality characteristics and provide a practical reference framework for international vocational education cooperation. VoCasian's focus is on the fourth core element (Qualification of vocational education personnel), while the German-Georgian vocational education cooperation also touches

upon other core principles to varying degrees, as will be demonstrated in the following sections.

2 TVET systems at a glance

As indicated in the introduction, achieving the objectives of VoCasian requires a deep understanding of the respective national TVET systems, with a focus on the training of vocational education personnel. This requirement will be addressed below, beginning with an examination of the specifics of the German TVET system (2.1), followed by an analysis of the Georgian TVET system (2.2), and subsequently outlining the necessary implications (2.3) based on these foundations.

2.1 Germany

According to the Organization for Economic Co-operation and Development (OECD), the greatest strength of the German vocational education system lies in its dual training system and the principles embodied therein [13]. The core objective of this modern-oriented vocational education is to impart the necessary vocational skills, knowledge, and abilities (occupational competence) required to perform qualified professional activities in a changing work environment, within a structured training program. Furthermore, it aims to enable the acquisition of the necessary professional experience [14]. In the dual training system, the vocational qualifications and competencies are oriented towards the needs and requirements of the economy, facilitating a smooth transition for young people from training to the labor market.

The dual principle of German vocational education is expressed in the traditional close interconnection between theory-based learning in vocational schools and regular practice-oriented training in companies. These two elements complement each other by enabling theoretical knowledge to provide a solid approach to practical problems in the workplace. Following this understanding of vocational education, not only technical knowledge is imparted, but also occupational competence is promoted, which includes technical, personal, social, methodological, communication, and learning competencies [15, 16]. Occupational competence is understood as the individual's readiness and ability to act appropriately, thoughtfully, and individually, as well as socially responsibly, in professional, societal, and private situations [17]. Additionally, trainees should be enabled to manage professional tasks and problems in a goal-oriented and methodologically guided manner [18].

Learners are thus enabled to shape their working environment and to explore and pursue sustainable paths independently and purposefully. Occupational competence is based on the concept of complete work actions [19], fostering an understanding of and ability to operate within complex work systems. Accordingly, apprentices are expected to develop competencies for their extracurricular and post-school lives, with the development of occupational competence requiring specific methodological-didactic design of teaching-learning arrangements [20]. In this context, design-oriented vocational edu-

cation [21], as well as work process-oriented [22] and situated learning [23, 24], hold particular significance. The action-oriented design of learning processes is of great importance in vocational education research and practice. However, due to the variety of terms (i. e., insufficient conceptual consistency and uniform reception of the normative language), the purported advantages and effectiveness of action-oriented training concepts are sometimes hotly debated [16].

Closely associated with the dual system of TVET is the cooperation between learning venues. This cooperation involves the collaboration between companies and vocational schools, which in Germany contributes to ensuring modern and future-oriented training [25]. The educators in the dual system or dual vocational education, specifically vocational school teachers (place of learning: vocational school) and company trainers (place of learning: training company) are considered the key pillars who, supported by the state and economical stakeholders, operate interlinked at all critical points of vocational education. The teaching profession, in particular, is regarded as a distinct profession. Vocational school teachers are both specialists in theoretical vocational subjects and general education. The foundation for the professional practice of German vocational school teachers is laid during teacher training studies (the first phase of professionalization), in which the state invests significantly. This is followed by a teaching internship (18 months), during which graduates gain teaching practice at vocational schools [26]. Only after completing this phase and passing the necessary examinations do they officially begin their profession as vocational school teachers, a role that is continuously supported through further training. The latter serves to maintain and expand professional knowledge, as megatrends (e. g., digitalization, sustainability) or unforeseen events like the recent COVID-19 pandemic may bring new qualification requirements (e. g., methodological, pedagogical) and a changed understanding of the role of vocational educators [27].

Thus, it can be concluded that the foundation for the appreciation of the teaching profession in Germany is largely laid during the professionalization phase, to which the academic teaching and support staff at universities make a crucial contribution. The exceeding importance of (vocational school) teachers was demonstrated by Hattie [28] in a meta-study, which showed the precedence of personal (teachers) over structural factors highlighting the fact: what teachers do matters. It was further pointed out that the acquired skillset – that teachers can gain over time – makes the difference [28, 29]. Consequently, it can be stated that good vocational education is correlated with competent and professional personnel. Accordingly, vocational education personnel is an essential success factor and is considered the core of German vocational education.

In summary, the German TVET system is characterized by the demand-driven qualification of skilled workers, the integration of school-based and company-based learning, and academic teacher training [30]. The dual approach and university-based teacher education are particularly unique features of German vocational education [31, 32], which have a sustainable impact on the employability of young people [32]. The performance and strengths of the German dual system of TVET are recognized worldwide, reflected in the high interest in both aligning with and benefiting from it [31].

2.2 Georgia

In Georgia, there are currently no standardized, systematic, methodological-didactic guidelines for the qualification of vocational education personnel. There is not only a lack of academic training in subject-specific didactics, pedagogical-psychological knowledge, and organizational and counseling skills for prospective teachers, but there is also a fundamental deficiency in the necessary infrastructure to train vocational education personnel in a competence-based, action-oriented, and work-process-oriented manner [33].

Currently, teacher education in Georgia is conducted purely as a subject-specific study program, completely disregarding the previously outlined aspects of professional knowledge [34], or even the practical possibility of a teaching internship. Consequently, while future Georgian vocational education personnel do obtain an academic (subject-specific) degree, they must undertake additional training and/or seminars before commencing their vocational pedagogical roles to acquire the specific knowledge of the vocational branch and, at least to some extent, the competencies that crucially influence the actions of a teacher [29, 34]. The responsibility for imparting profession-specific competencies lies with the Teacher Professional Development Center, which is related to the MOES in terms of administration and regulation guidelines and responsibilities. However, this training or retraining process is neither well-structured nor comprehensive [35]. Additionally, programs focusing on the development of soft skills dominate compared to their academic counterparts [36], resulting in a lack of methodical-didactic and pedagogical-psychological competence among teachers even after they have completed their training [35].

As a result, Georgian vocational education continues to be dominated by teacher-centered instruction, oriented towards subject-specific sciences, with little emphasis on imparting occupational competence. This includes the ability and willingness for lifelong learning and the promotion of self-directed problem-solving in professional contexts [37]. Compounding the issue, more than half (approximately 60 %) of Georgian TVET teachers are employed only part-time [38], and their employment contracts are less secure compared to those of general education teachers [4]. Furthermore, it should be noted that the described pre-service qualification at the Teacher Professional Development Center is not mandatory. Consequently, a number of teachers are employed solely based on their practical experiences and knowledge, without any formal pedagogical qualification [39].

In addition to profession-specific competencies, the implementation of action-oriented training lacks suitable teaching and learning materials. This deficit also impacts the preparation of trainees for real working life, which acts as a barrier to innovation and quality. This problem is particularly related to curriculum development for the qualification of vocational education teachers. The responsibility for this falls to the training institutions themselves, which complicates the assessment, evaluation, and comparability of the respective objectives intended by the curricula. Regarding quality standards and assurance, the TVET system also lacks evaluation standards, which simi-

larly fall under the responsibility of each vocational institution, making vocational qualifications hardly comparable.

Furthermore, there is a lack of recognition procedures for learning outcomes, competencies, and previous qualifications, as well as substantial structures for recruiting trainees (e. g., career orientation), rendering the system relatively opaque, impermeable, and inflexible. This carries the risk of redundant qualifications and educational dead ends, as access to vocational education is often limited, and system mobility (e. g., lateral entry) is not guaranteed [40]. These limitations are particularly severe given that vocational education traditionally receives less recognition and societal appreciation in Georgia compared to higher education [4], as also highlighted by the employment conditions of vocational education teachers [38].

The current state of teacher education in Georgia, both in the narrower and broader sense of vocational education, prompted the Vocational Education and Training Development Strategy [4]. The overarching goal is to elevate vocational education and training, as well as vocational education personnel, to a quality level that meets not only national development efforts but also international standards [33]. To achieve this, it is essential to redefine curricula and establish academic structures for vocational education research and the professionalization of teachers.

2.3 Implications

As highlighted in section 2.2, the need for reform in Georgia's vocational education sector arises from a multitude of problems. The corresponding reform efforts [4] are beginning to show initial results, as evidenced by an increasing number of trainees since the reforms began [41, 42]. Additionally, the equipment of vocational schools has been improved, teaching and learning environments have been modernized, the practical component of vocational education has been increased, and access for people with disabilities has been optimized [43]. Despite these early successes, the results of the vocational education reform achieved so far are still not very convincing. Due to the lack of comprehensive concrete measures, the formal TVET system in Georgia continues to show significant deficiencies, particularly regarding the professionalization of vocational education teachers. Moreover, the demand for highly qualified skilled personnel continues to grow, paralleling the inadequate vocational education structures. As a result, for Georgian companies it is difficult to source qualified skilled workers, indicating that the national economic system remains reliant on the consistent continuation of the reform path and demand-driven educational policy solutions.

Consequently, in recent years, Georgia has increasingly endeavored to integrate elements of the dual system into its own vocational education, recognizing the high practical component, the cooperation between learning venues, and teacher education as key advantages of the German vocational education system. As outlined, academic teacher education in Germany is considered an essential component and a pillar of the dual TVET system. This is made possible by a highly capable university system that, by international comparison, allows for research-oriented, practice-related, and self-directed study, which also applies to the training of teachers for vocational schools [44].

The fact that the professional qualification of vocational teachers is based on a university education underscores the importance of vocational education and vocational education personnel in Germany. No other country worldwide requires a university degree as a standard prerequisite for entry into teaching at vocational schools, regardless of the specific vocational field. Consequently, international efforts to develop TVET systems place special emphasis on attempts to anchor vocational teacher education and other vocational training programs within universities, recognizing that this enhances the attractiveness and quality of both the teaching profession and vocational education. It is important to note that the success of such efforts, in addition to general study conditions, is closely linked to the qualification of university instructors (lecturers), who not only take on teaching responsibilities but also promote change processes and provide both professional and personal counseling and support [45]. This applies equally to the involved professors and the academic mid-level faculty.

This provides a natural starting point for VoCasian, whereby the expertise for the (bottom-up) professionalization of vocational education teachers – accompanied by a corresponding research and evaluation design – should be transferred. In the absence of fundamental structures for an academic training program for vocational education personnel in Georgia, the initial aim is to establish a qualified academic mid-level faculty. This faculty will engage in research and teaching while pursuing qualification goals (doctorate/postdoctoral lecture qualification). Based on this foundation, appropriate academic chairs/professorships are to be established. To align the corresponding university teaching as closely as possible with the educational needs and work processes of the target country, ex-ante analyses are conducted. These analyses serve to expand, detail, and deepen already known information from the literature and exploratory and cooperation discussions (e. g., regarding target sectors such as logistics, construction, tourism, STEM) [43], and are embedded in an overarching transfer strategy.

3 Transfer strategy

The Georgian education reform has already been outlined in the introduction as practical, needs-oriented (economy), and based on the standards of the German TVET system. Related to this, Euler [46] points out that individual elements, concepts, or system components of foreign education systems cannot be transferred as a mirror image to other countries but have to be adapted to the educational, economic, and social framework conditions and goals of the respective recipient country. This applies in particular to the trainings of vocational teachers, which are integrated into the national structures of TVET. Empirical evidence for this assessment is provided by (meta) evaluations of past transfer projects and vocational training measures, which paint a rather sobering picture in terms of effectiveness, efficiency, relevance, and – above all – sustainability and broad impact [46, 47]. With a balance scorecard concept, Stockmann [48] conducted around 80 individual project evaluations and proposed a generalized sustainable model for the VEC (cf. fig. 1).

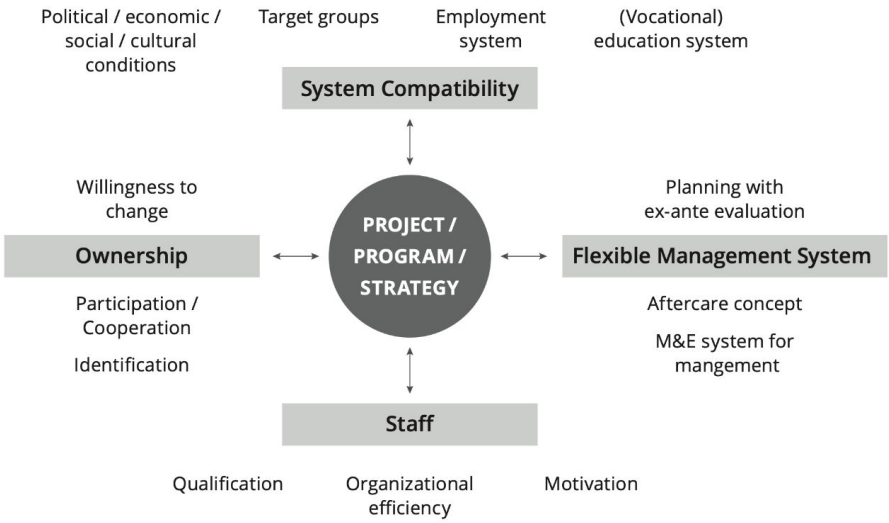


Figure 1: Generalized sustainable VEC model

The model shows four key factors for a successful VEC: system compatibility, ownership, personnel, and flexible control. Due to the high degree of continuity, it is essential to take these core parameters into account. As a result, program management and the transfer strategy are based on the model of key variables.

The VoCasian project was evaluated in terms of system compatibility, ownership, and personnel at an early stage of the project. The results of the initial analyzes suggest that the project will run effectively and sustainably. The outlined program is system-compatible insofar as it encounters stable economic and political conditions in the target country. Furthermore, the project can be rated as highly compatible, because it not only starts – as outlined in the introduction – with the vocational training reform of the target country, but also reacts explicitly to the objective of the Georgian Ministry of Education [4, 41], which sees the academization of teacher training as a necessary constitutive reform step that affects all areas of vocational education and training.

The system compatibility is also reflected in the variables ownership and staff. Here, the reform course is expressed on the part of the Georgian partner organizations in the high willingness to change, because the university (implementation partner) sees the educational offer not only as a sustainable expansion of the existing study program portfolio, but also as a substantial contribution to the implementation of educational policy targets. Furthermore, there is agreement between the central project actors (acceptance of common goals), regarding the implementation of the vocational training program (e. g., measures, phases) which includes the joint development and control of the project (participation). In addition, the Georgian university partner was chosen based on the pronounced organizational efficiency (cf. fig. 1), which manifests itself in efficient organizational structures, an adequate technical infrastructure, the right to award doctorates (H+ status), a close educational network and qualified and motivated employees.

In particular, staff is a central and indispensable key variable for achieving sustainability. Without such staff, neither a sustainable operation of the funded institution nor a multiplication or systemic effect can be achieved [48]. In addition to technical and administrative components, the qualification also includes teaching problem-solving skills and developing the ability to act competently. Accordingly, scientific employees of the Georgian partner university are actively involved in the joint processing of the project (formation of a transnational working group), which is another example of the interdependence (staff, ownership) of the key factors. The capacity building pursues the overriding goal of enabling a critical mass of Georgian staff to continue the educational service even after the end of the project and to be able to react flexibly and appropriately to changing systemic conditions (e. g., educational system, labor market). Capacity building is an inherent part of the bilateral VEC and relates to both the conception and accreditation of the doctoral program and the flexible management of the program.

The latter starts with well-founded project planning, which at best includes an ex-ante evaluation (e. g., needs analysis; cf. fig. 1) considering the political, socio-cultural, and economic framework conditions [49]. Although systematic needs analyses are required in the strategy papers for the VEC [50], they are largely not taken into account in the planning phase of previous projects [47]. In contrast to this, the orientation and design of the application-oriented doctoral program is empirically supported, which includes the analysis of the interest representatives and the educational needs of the target country. In order to obtain a comprehensive and detailed insight into the framework conditions and educational needs a mixed method approach [51] is applied. The Georgian university partner (cf. staff) is involved in both the conceptualization and operationalization (design of questionnaires, creation of interview guidelines) as well as data collection and evaluation. Accordingly, participation is reflected at all levels of the ex-ante evaluation.

As part of the stakeholder analysis, all relevant stakeholder groups (e. g., universities, students, ministries, companies) are identified and examined regarding their respective interests and influence on the profile formation of the course. This not only ensure to reveal the different interests of the actors involved, but also uncovered potential conflicts of interest and possible obstacles to the progress of the project. Recognizing challenges and risks at an early stage allows the development of solutions that meet the implementation requirements. At the same time, the educational and qualification needs of vocational teachers from the point of view of universities, vocational training institutions, the private sector and educational policy are recorded, whereby different organizational units and hierarchical levels (e. g. management and specialist level) taking into account different organizational units and hierarchical levels (e. g., management and specialist level) [52]. Therefore, it allows a certain flexibility regarding the application of the research strategy but at the same time increases the level of uncertainty and possibility of error. The term need is within this context not clearly definable [53] and describes more or less an in itself plastic, dynamic entity.

The results of the input evaluation based on the VEC model gradually feed into the iterative development of the demand-oriented doctoral program, which includes the development of the program concept, syllabi, and accreditation (cf. "Results of the BMBF project VoCasian" in this publication). The implementation and piloting of the program take place at the Georgian partner university, Ivane Javakhishvili Tbilisi State University, including formative and summative evaluations (monitoring and evaluation system, cf. fig. 1), which are also conducted transnationally. The evaluation encompasses both the educational process and the product [54], assessed from the perspectives of students, teachers, and the accreditation commission. The evaluation results (cf. "Reflection on pilot teaching" in this publication for the teachers' point of view) not only contribute to determining the current status of the demand-oriented doctoral program but also provide insights into obstacles and potential areas for improvement. If necessary, the educational measure will be adjusted based on the evaluation data in accordance with the flexible project management (cf. fig. 1).

4 Conclusion and Outlook

Georgia is responding to societal and economic policy challenges with a comprehensive package of measures to modernize the TVET system, aiming to make the country in the South Caucasus future-proof. One of the key pillars of the reform is the professionalization of vocational education teachers, for which the German TVET system shall serve as a model. However, modeling does not imply a direct blueprint, as demonstrated; while Germany can indeed serve as an example, its structures and elements must be aligned with the specific conditions of the target country. Thus, it is not about replication but rather a wise, differentiated transfer of appropriately adapted components. Ideally, this process follows a transfer model that promises sustainable VEC based on holistic program management. VoCasian is oriented towards the generalized sustainable VEC model.

The resulting design of a demand-oriented TVET PhD program promises to set the course for the academization of vocational education teachers in Georgia. Graduates will contribute to the professionalization of Georgian vocational education personnel in multiple ways. They can support the medium-term development of vocational education programs and chairs at Georgian universities, take on teaching responsibilities, or act as multipliers in politics, the private sector, and vocational education institutions. This illustrates the broad and diverse employment opportunities for future vocational education experts, suggesting that the risk of a brain drain [55] – which must always be considered as a counterpoint to the targeted brain gain in vocational education projects – is minimal. Furthermore, the short- and long-term goals of the Georgian vocational education reform anticipate a high degree of widespread impact and sustainability of the project outcomes, underscored by the continuous consideration of success factors for sustainable VEC (e. g., capacity building). Sustainability is also reflected in the effort to establish a Graduate School at the Georgian partner university (cf. "Sus-

tainability of the BMBF project VoCasian: Institutionalization of the project results via the format Graduate School" in this publication). Here, not only will the TVET PhD program be embedded, but additional demand- and practice-oriented academic offerings for (vocational) teachers will also be implemented (e. g., project management). Additionally, the development of dual study programs for vocational education and vocational education research is being explored and discussed by the project partners. These programs could facilitate cross-border student exchanges or the acquisition of a dual degree.

Furthermore, VoCasian holds significant transfer potential for other target countries facing similar educational policy and economic challenges, with comparable conditions and reform efforts (cf. "Advancing PhD programs" in this publication). This applies, for example, to the neighboring country of Armenia, which is also undergoing a period of transformation and aspires to reform its TVET system following the German model. Preliminary discussions and analyses of vocational education structures reveal numerous parallels among the South Caucasian (vocational) education systems [56]. In addition to literature reviews and document analyses, initial exploratory discussions have already been conducted with the Armenian Ministry of Education and the Yerevan Brusov State University (Yerevan, Armenia), during which there was significant interest in establishing a similar doctoral program and corresponding graduate schools for the professionalization of Armenian teachers. Furthermore, the German project partner has received expressions of interest from Ukraine and Kazakhstan, which are also keen on reform-appropriate solutions for the professionalization of vocational education personnel.

References

[1] Lauder, H., Brown, P., Dillabough, J. A., & Halsey, A. H. (2006). *Education, Globalization, and Social Change*. Oxford University Press.

[2] Larsen, K. & Vincent-Lancerin, S. (2002). International trade in educational services: Good or bad? *Higher education management and policy 14*(3), 9–45.

[3] Sauvé, P. (2002). Trade, education and the GATS: What's in, What's out, what's all the fuss about? *Higher education management and policy 14*(3), 47–76

[4] MOES [Ministry of Education and Science Georgia] (2013). *Vocational Education and Training Development Strategy for 2013–2020*. Online: http://mes.gov.ge/uploads/12.%20VET%20Strategy%202013-20_EN.pdf (Accessed: 10.07.2024).

[5] MOES (2023). *Vocational Education. 2022 Report on the Action Plan of the Unified National Strategy for Education and Science of Georgia*. Online: https://mes.gov.ge/uploads/2023/2022%20VET%20Report.pdf (Accessed: 10.07.2024).

[6] Riedl, A., & Schelten, A. (2011). Das Münchner Forschungsprogramm zur Qualitätssicherung von Lehr-Lern-Prozessen in der gewerblich-technischen Berufsausbildung. *Zeitschrift für Berufs-und Wirtschaftspädagogik (Beiheft 25)*, 147–158.

[7] Dunkel, T. (2013). Making IVET an attractive option – zur Attraktivität beruflicher Bildung in Europa. *BWP, 4*, 42–46.
[8] Heuinger, W., & Jonde, B. (2016). *Trendbarometer 2016. Exportbranche Aus- und Weiterbildung*. Bertelsmann.
[9] Wagner, C., & Rückmann, J. (2017). Qualitätsmanagement in der beruflichen Bildung in Deutschland: ein aktueller Überblick mit dem Schwerpunkt der schulinternen Evaluation. *Proceedings of 5. Österreichische Berufsbildungsforschungskonferenz*. Wbv Media.
[10] Blömeke, S. (2009). Lehrerausbildung in Deutschland. *PÄD-Forum: unterrichten erziehen, 37*(1), 5–8.
[11] OECD. (2018). *Bildung auf einen Blick 2018: OECD-Indikatoren*. wbv Media.
[12] Thomann, B., & Wiechert, M. (2013). Berufsbildungszusammenarbeit aus einer Hand. *Berufsbildung in Wissenschaft Und Praxis, 5*, 35–37.
[13] Hockel, K., & Schwartz, R. (2010). *Lernen für die Arbeitswelt: OECD-Studien zur Berufsbildung – Deutschland*.
[14] BBiG. [Berufsbildungsgesetz] (2005). *§ 1 Ziele und Begriffe der Berufsbildung*. Online: https://www.gesetze-im-internet.de/bbig_2005/__1.html (Accessed: 10.07.2024).
[15] Bader, R., & Müller, M. (2002). Leitziel der Berufsbildung: Handlungskompetenz. Anregungen zur Ausdifferenzierung des Begriffs. *Die Berufsbildende Schule, 54*, 176–181.
[16] Martsch, M., & Schulz, A. (2022). *Berufliche Lösungsexpertise ausbilden. Konzeption, Implementierung und Evaluation eines Blended Learning Arrangements zur Förderung des problemlösenden Denkens und strategischen Lernens in der betrieblichen Ausbildung*. Universität Magdeburg: Dissertation.
[17] KMK. [Kultusministerkonferenz] (2021). *Handreichungen für die Erarbeitung von Rahmenlehrplänen der Kultusministerkonferenz für den berufsbezogenen Unterricht in der Berufsschule und ihre Abstimmung mit Ausbildungsordnungen des Bundes für anerkannte Ausbildungsberufe*. Online: https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2021/2021_06_17-GEP-Handreichung.pdf (Accessed: 10.07.2024).
[18] Winkler, F., & Martsch, M. (2017). Problemlösefähigkeit in der betrieblichen Ausbildung – Neue Wege der Konzeptspezifikation, Operationalisierung und Messung. *bwp@ Berufs- und Wirtschaftspädagogik – online, 32*, 1–31.
[19] Hacker, W. & Sachse, P. (2014). *Allgemeine Arbeitspsychologie, Psychische Regulation von Tätigkeiten* (3rd edition). Hogrefe.
[20] Gericke, E. E. (2019). Herausforderungen und Strategien für einen berufsorientierten Berufsschulunterricht für Kfz-Mechatroniker. In T. Vollmer, S. Jaschke, M. Hartmann, B. Mahrin, & U. Neustock (Eds.), *Gewerblich-technische Berufsbildung und Digitalisierung. Praxiszugänge – Unterricht und Beruflichkeit* (pp.139–153). wbv.
[21] Rauner, F. (1987). Zur Konstitution einer neuen Bildungsidee: "Befähigung zur Technikgestaltung". In R. Drechsel & J. Twisselmann (Eds.), *Ende der Aufklärung? Zur Aktualität einer Theorie der Bildung, Foschungsreihe des Forschungsschwerpunktes "Arbeit und Bildung", 6. Band* pp. 266–297). Universität.
[22] Dehnbostel, P. (2007). *Lernen im Prozess der Arbeit (Studienreihe Bildungs- und Wissenschaftsmanagement)*. Waxmann.

[23] Bünning, F., Krumbach, J., Lehmann, J., Martsch, M., & Röhming, M. (2019). Situiert lernen mit CoSiTo: Neue Ansätze zur Gestaltung des Technikunterrichts. In F. Bünning (Ed.), *Technik lernen mit interaktiven Lehr-/Lernplattformen: Erfahrungen – Wirksamkeit – Perspektiven* pp. 11–30). wbv.
[24] Reinmann, G., & Mandl, H. (2006). Unterrichten und Lernumgebungen gestalten. In A. Krapp & B. Weidenmann (Eds.), *Pädagogische Psychologie. Ein Lehrbuch (5. Aufl.)* pp. 613–657). Beltz PVU.
[25] Liu, X., & Schuppener, L. L. (2019). Adapting and evolving-learning place cooperation in change: A comparative study of the vocational and educational training system in China and Germany. *International Journal of Information and Education Technology, 9*(9), 599–606.
[26] Bölting, F-J., & Thomas, S. (2007). Das Referendariat als Ausbildungsphase der Berufseinführung. In A. Óhidy, E. Terhart, & J. Zsolnai (Eds.), *Lehrerbild und Lehrerbildung* pp. 203–217). VS Verlag für Sozialwissenschaften.
[27] Schulz, A., & Martsch, M. (2012). Blended Learning by doing. *Berufsbildung, 66*, 39–42.
[28] Hattie, J. (2009). *Visible Learning. A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. Routledge.
[29] Steffens, U., & Höfer, D. (2014). ??? Die ‚Hattie-Studie ‘und ihre Bedeutung für die Unterrichtspraxis. In G. Höhle (Ed.), *Was sind gute Lehrerinnen und Lehrer* pp. 51–65). Leverkusen: Barbara Budrich.
[30] Wittmann, E. (2019). System, Struktur und Organisation der Berufsbildung in Deutschland. In *Springer Reference Sozialwissenschaften: Handbuch Berufsbildung* pp. 1–12). Springer Fachmedien.
[31] Jonda, B., & Heusinger, W. (2016). *Trendbarometer 2016 – Exportbranche Aus- und Weiterbildung*. Bertelsmann.
[32] Dehmel, A. (2011). *Lehrerbildung im internationalen Vergleich: Eine diskursanalytische Studie zur Lehrerausbildung für den berufsbildenden Bereich in Deutschland und England*. Eusl-Verlagsgesellschaft.
[33] Andguladze, N., & Mindadze, I. (2015). Georgia. In W. Hörner, H. Döbert, L. Reuter, & B. von Kopp (Eds.), *The Education Systems of Europe* pp. 293–304). Springer.
[34] Baumert, J., & Kunter, M. (2011). Das Kompetenzmodell von COACTIV. In M. Kunter et al. (Eds.), *Professionelle Kompetenzen von Lehrkräften. Ergebnisse des Forschungsprogramms COACTIV* pp. 29–53). Waxmann.
[35] Grdzelidze, I. et al. (2022). Major challenges of Vocational Education in Georgia – Vocational Education providers' perspective. *ICERI2022 Proceedings*, 8177–8182.
[36] Unesco-Unevoc. (2015). *World TVET Database Georgia*. https://unevoc.unesco.org/wtdb/worldtvetdatabase_geo_en.pdf
[37] ETF [European Training Foundation]. (2019). *Torino Process 2018–2020 – Georgia National Report*. ETF.
[38] ETF. (2021). *Evaluation of Georgia's VET Strategy 2013–2020. Final Report 2021*. Turin: ETF.

[39] Behrens, A., Natriashvili, K., & Schröder, T. (2023). Governance of TVET Teacher Development and Management: the example of recent TVET reforms in Georgia. TVET@Asia, 20, 1–16.
[40] Schiller, S., Milolaza, A., & Meerten, E. (2008). Leistungspunktesystem in der beruflichen Bildung Zielsetzung und Schwerpunkte der BMBF-Pilotinitiative DECVET. *BWP, 4*, 50–51.
[41] MOES (2022). *2022–2030 Unified National Strategy of Education and Science of Georgia*. Tbilisi: MoES.
[42] OECD (2019). *Monitoring Georgia's SME Development Strategy 2016–2020*. Paris: OECD Publishing.
[43] GOVET (2016). GOVET unterstützt die georgische Berufsbildungsreform. Online: https://www.govet.international/de/49909.php
[44] Wissenschaftsrat (2008). *Empfehlungen zur Qualitätsverbesserung von Lehre und Studium*. Köln: Geschäftsstelle des Wissenschaftsrates.
[45] Schützenmeister, J. (2013). Überlegungen zur Positionierung von Hochschullehrern zur Einheit von Forschung und Lehre in den pädagogischen Teilen der Lehrerbildung. In A. B. Kunze et al. (Eds.), *Beruf: Hochschullehrer* pp. 233–250). Brill Schöningh.
[46] Euler, D. (2013). *Das duale System in Deutschland – Vorbild für einen Transfer ins Ausland*. Bertelsmann Stiftung. Online: http://www.schulprojekte-bw.de/fileadmin/default/dokumente/brennpunktthema_2_euler_studie_das_duale_system_in_deutschland.pdf
[47] Stockmann, R., & Silvestrini, S. (2013). *Metaevaluierung Berufsbildung: Ziele, Wirkungen und Erfolgsfaktoren der deutschen Berufsbildungszusammenarbeit*.Waxmann.
[48] Stockmann, R. (2019). Ziele, Wirkungen und Erfolgsfaktoren der deutschen Berufsbildungszusammenarbeit. In M. Gessler, M. Fuchs, & M. Pilz (Eds.), *Konzepte und Wirkungen des Transfers Dualer Berufsbildung* pp. 121–162). Springer..
[49] Silvestrini, S. (2011). *Ex-ante-Evaluation. Ein Planungsansatz für die Entwicklungszusammenarbeit*. Waxmann.
[50] BMZ [Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung] (2005). *Berufsbildung in der entwicklungspolitischen Zusammenarbeit*. Bonn: BMZ.
[51] Kuckartz, U. (2014). *Mixed Methods: Methodologie, Forschungsdesigns und Analyseverfahren*. Springer.
[52] Asche, E. (2020). *Bedarfserschließung bei Anbietern beruflicher Weiterbildung – Ein plastischer Gegenstand und seine relationale Adressierung*. Dissertation, Hannover: Universität Hannover.
[53] Schlutz, E. (1998). Bedarfserschließung. *Grundlagen der Weiterbildung- Praxishilfen* pp. 1–27). Luchterhand.
[54] Stufflebeam, D. L., & Shinkfield, A. J. (2007). *Evaluation theory, models and applications*. Wiley.
[55] Docquier, F., Lohest, O., & Marfouk, A. (2007). Brain drain in developing countries. *World Bank Economic Review, 21*, 193–218.
[56] Bandau, S., & Ganjalyan, D. (2015). Armenia. In W. Hörner, H. Döbert, L. Reuter, & B. von Kopp (Eds.), *The Education Systems of Europe* (2nd edition.) Springer.

Technical Education for Sustainable Development (TESD)

S. Brämer

For coping with societal changes and global challenges, as well as shaping technological change and digital transformation, technical education plays a central role. These developments particularly affect future generations, so it is crucial for them to develop a deep understanding of technical and scientific relationships and dependencies, as well as their implications for the future. It is important to recognize and understand the interdependence of technology, environment, society, and economy, anticipate challenges in the environment, and solve them. Education for Sustainable Development (ESD) is seen as a possible key to long-term anchoring of the goals to sustainable development. All young people must be able to recognize and assess the technical, economic, ecological, and social consequences of decision-making and action alternatives, as well as be sensitized, motivated, and empowered to take actions in line with sustainability. The dimensions and perspectives of technology already encompass the dimensions of the concept of sustainability as well as aspects of ESD. Through the concept of Technical Education for Sustainable Development (TESD), approaches, concepts, and models of technical education can be linked with those of (Vocational) Education for Sustainable Development. TESD means that the subject area "technology" must always be considered in terms of economic, ecological, and social consequences of decision-making and action alternatives in order to support the development of evaluation, design, and system competencies in young people.

1 The concept of sustainability – An Introduction

In the discussion about the future development of humanity and its living space, a central concept has evolved over the past decades, commonly known as "sustainability" or "sustainable development". Sustainable development refers to the process of "[...] societal change, while the concept of sustainability [...] describes the end of such a process [...]" [1]. Sustainable development is considered successful when meeting the needs of future generations is not restricted by satisfying present needs. It aims to improve the current situation without endangering the social, economic, and natural aspects of future generations. Due to the diverse interactions with these aspects, this context does not refer to a scientifically defined term but rather to a socio-political and normative guiding principle, namely the guiding principle of sustainable development [1].

In Germany, the tripartition of the aspects of sustainable development was introduced through the Enquete Commission "Protection of Humans and the Environment," which in 1998 dealt with the implementation of the sustainability concept. In its final report, this commission refers to ecological, social, and economic aspects as three

equally significant dimensions of sustainability [2]. Diettrich et al. [3] identify "[social] justice, ecological compatibility, and economic performance" as goals of sustainable development. The UN's Agenda 2030 defines 17 global sustainability goals [4]. In a presentation by the Stockholm Resilience Center – the "Wedding Cake" – these goals are integrated into the three dimensions (Fig. 1). The biosphere (ecological dimension) is considered the basis upon which society (social dimension) and subsequently the economy (economic dimension) is built.

In the ecological dimension, it comprehensively addresses the factor of nature in the sustainability discussion – primarily in interaction with humans. Through their actions, humans have utilized, shaped, or otherwise influenced nearly all ecosystems on Earth for their purposes. "[...] many of these changes have now become so significant that they impair current and even more future utilization possibilities, thereby jeopardizing or practically making impossible the goal of sustainable future-compatible use [...]" [2]. Since the environment and ecosystems undergo constant change even without human influence, it is not possible to scientifically define optimal environmental conditions or precise measures for their preservation. In general, it is recognized that the resilience limits of each ecosystem should not be exceeded, natural livelihoods should be preserved, and thus also those of humans and their health should be protected.

The general function of economic activity is to "[...] allocate scarce goods to their highest valued uses at the lowest cost of use [...]" [2], thus using the available resources of physical and human capital with the highest possible productivity and efficiency to provide goods and services to the population. This function, as well as securing the material existence of the state and society, are indicators by which the performance of an economic system can be measured and determined [1]. At a global level, systems of free market economies are generally taken into account, with their mutual competition serving as a driver for their respective development. In terms of sustainability, it is important to maintain this self-regulation and development and prevent the formation of monopolies and other harmful economic structures. Furthermore, in order to fulfill future responsibilities, it is necessary to preserve the value of production factors to ensure the production capabilities of future generations.

The preservation and fair distribution of social basic goods, as well as their development and transmission to future generations, constitute the content of the social dimension. These basic goods include individual goods such as life itself, basic provisions, and personal health, and also social goods such as tolerance, integration, sense of justice and fairness, or solidarity. The main focus in the distribution of these basic goods lies in achieving and maintaining social peace, the goal of which requires both the fair distribution of resources across all regions, social strata, and groups, as well as solutions to issues of cultural integration [1]. To minimize risks for individuals in a society, many countries have systems based on the principle of solidarity, in which people receive benefits from the rest of society through redistribution after meeting predefined criteria to continue enabling them to participate in society with dignity. Preserving and passing on these sometimes delicate solidarity systems is a significant aspect of social sustainability within a society.

Figure 1: "Wedding Cake" – Integration of the 17 UN Sustainable Development Goals into the three dimensions of sustainability [5]

During the exploration of the concept of sustainability, different frameworks have been developed to illustrate the principle of sustainability. The most well-known models are the "Three-Pillar Model," the "Intersection or Harmony Model," and the "Sustainability Triangle" [6]. The following figure depicts the evolution of understanding sustainability (Fig. 2).

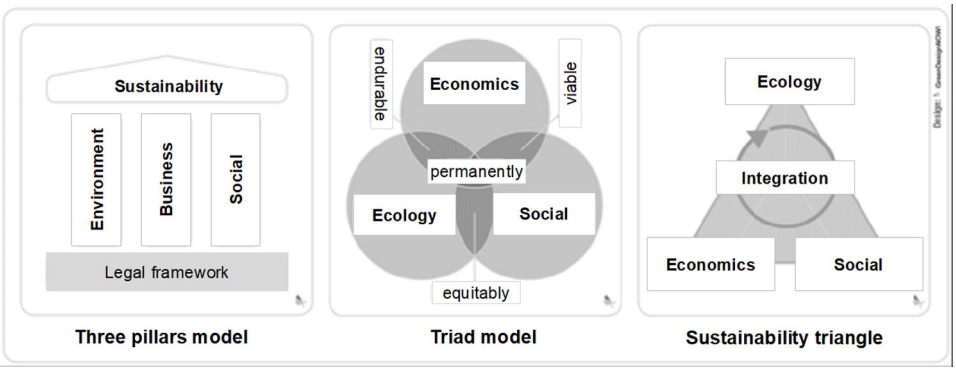


Figure 2: Models of sustainability [7]

The "three-pillar model" represents the oldest concept of sustainable development. The presentation of the dimensions – environment, economy, and social aspects – as pillars implies a simultaneous and equal implementation of these three. This is precisely where the criticism of this model arises, as the different dimensions do not seem to influence each other. Through the depicted overlaps in the "triad or intersection model," the integrative, interlocking relationship is illustrated and made clear. The integrative character is further emphasized in the representation of the "sustainability triangle" [7].

The sustainability triangle is thus an advancement of the two previously described models. "As a symbol of symmetry and balance, it unites the various aspects of sustainability" [6]. In this model, the three dimensions no longer stand side by side unconnected but form a unit. The sustainability triangle consists of an isosceles triangle, which is meant to show that all three sides are equally important. The area inside the triangle provides an opportunity for differentiating various contents and illustrating different relationships. It aims to raise awareness that while the three individual areas can be operationally separated, they are logically interconnected and cannot be considered in isolation (Fig. 3).

"This diagram, also known as Gibbs' triangle, forms a unit consisting of three components: $x + y + z = 100\,\%$." [6]. The three units represent the corners of the triangle, namely ecology, social aspects, and economy. Through this division, the integrative sustainability triangle can be mathematically represented very well in comparison to the "three-pillar model" or "intersection model." For this purpose, corresponding coordinates must be determined. Ideally, a combination of 33 % each would be necessary here to enable a balance of all three dimensions. "By using the interior area of the triangle, one obtains a multi-perspective view to represent the mixing ratios of the individual dimensions. [...] it thus does far better justice to the actual complexity of the sustainability issue than the frequently used 'pillar representation' [...]" [8].

One challenge of sustainable education lies in the early and fundamental promotion of sustainable thinking and action to ensure the success of the transformation process towards sustainability. Education for Sustainable Development (ESD) is considered key to the long-term anchoring of sustainable development goals [9]. Vocational education has the task of integrating lifelong learning processes with the working world, thereby laying the foundation for sustainable professional and private actions. A central prerequisite and an important building block for this is a comprehensively qualified vocational education staff. Holistic qualification enables the embedding of sustainable development into vocational training practices, thus empowering trainees to contribute to the economy and society through sustainable thinking and action.

Vocational Education for Sustainable Development (VESD) addresses this goal by aiming to "promote competencies that enable shaping work and life in terms of sustainability. This involves orienting professional actions towards their intra- and intergenerational ecological, social, and economic impacts" [10]. The prerequisite for implementing sustainability or sustainable thinking and action is appropriate evaluation, design, and system competence. Evaluation competence refers to the ability to recog-

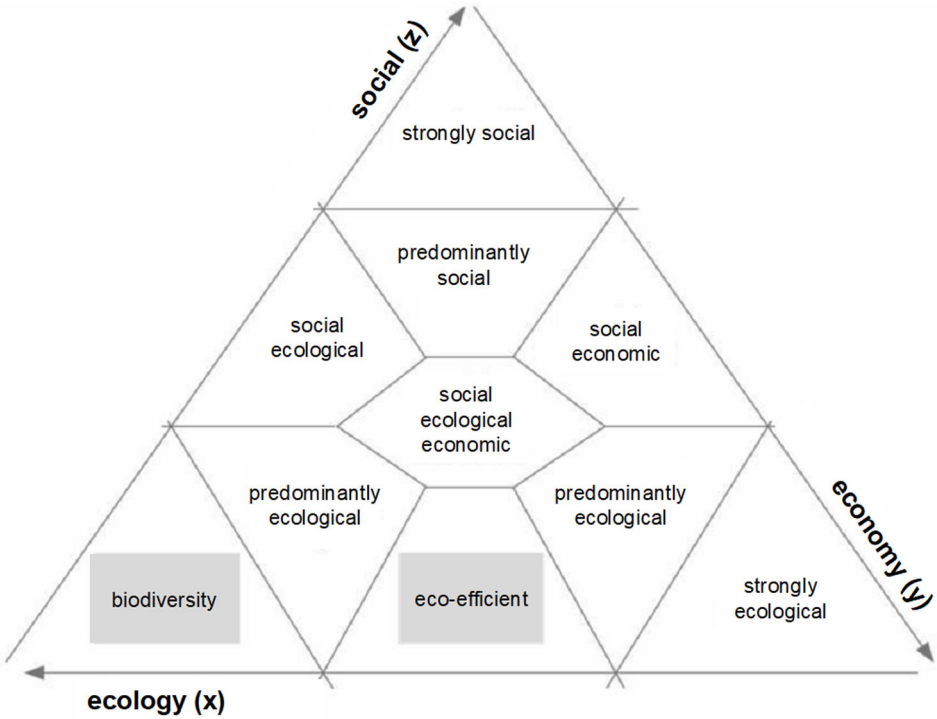


Figure 3: The integrating sustainability triangle [8]

nize different values in decision-making, weigh them against each other, and incorporate them into the decision-making process [11]. Design competence describes the ability to apply knowledge about sustainable development and identify problems related to unsustainable development. It involves recognizing and understanding the interdependence of economy, society, and environment, anticipating challenges in one's surroundings, and possessing the ability to address and solve these challenges. System competence is defined as the ability to handle and understand global systemic relationships. Knowledge focused on global development processes is characterized by a high degree of complexity, which can best be addressed through a system-oriented perspective.

The focus of vocational education must therefore be on promoting evaluation, design, and system competencies within vocational action competence. The central guiding principle should be that sustainability dimensions manifest in concrete vocational fields and situations. Through appropriate didactic teaching and learning arrangements, apprentices learn to apply knowledge of sustainable development and to identify problems of non-sustainable development, i. e., to draw conclusions from present analyses and future studies about ecological, economic, and social developments in their interdependence and to make, understand, and implement decisions based on them to realize sustainable development processes. Thus, action competence is the overarching competence understanding of education for sustainable development. "Action compe-

tence is the ability and willingness of individuals to act appropriately and professionally in professional, private, and societal situations, personally thought out and with social responsibility, i. e., to solve impending problems purposefully based on knowledge and experiences as well as through own ideas independently, evaluate the solutions found, and further develop their ability to act. It is on the one hand (provisional) result of learning and development processes of the individual in social integration, on the other hand also a prerequisite for the further development of individual competence" [12]. Within specific vocational training programs, sustainability-related competencies must be identified and described while simultaneously establishing a "[...] systematic connection between job-related work processes, company-organizational decisions, societal-political framework conditions with the goals of sustainable development as well as the dimensions of vocational action competence [...]" [13]. The Approach for Technical Education for Sustainable Development (TESD) takes on this challenge by developing, testing, and evaluating sustainability-oriented teaching-learning arrangements (TESD-concepts) in the sense of Technical Education for Sustainable Development (TESD). Building on the key role of technical education for education for sustainable development, the strategy is pursued to institutionally anchor the TESD-approach within teacher training programs.

2 Technical Education for Sustainable Development (TESD)

2.1 (Vocational) Education for Sustainable Development (ESD/VESD)

Education for Sustainable Development (ESD) is considered key to the long-term anchoring of the goals of sustainable development [14]. The guiding principle of ESD is associated with the idea that ecological, economic, and social goals must be pursued in all areas of society in order to achieve sustainable development [15]. Therefore, education should impart the ability to actively and responsibly shape the future and contribute to a just and environmentally sustainable development of the world. A prerequisite for implementation is the corresponding competence in evaluation, design, and systems. Design competence "[...] refers to and describes the ability to apply knowledge of sustainable development and recognize problems of unsustainable development [...]" [14].[1] The mutually influencing dimensions of sustainability (Economy, Society, and Environment) must be considered and understood in order to make decisions and implement processes that realize sustainable development [16]. ESD encompasses all activities that enable people to think and act in a future-oriented manner, allowing them to understand the impacts of their actions and make responsible decisions [17]. To achieve this, the acquisition and early promotion of system, evaluation, and design competencies are central goals [14]. A prerequisite for this is that young people, among other things, possess knowledge of resource-efficient production methods, social

1 Rost [11] provides a very good overview of system, evaluation, and design competencies (Rost 2005).

conditions in raw material extraction, knowledge of transport routes, or health consequences [18]. In order to achieve the goals of ESD or BBNE, technical education, especially in light of the changing demands of the modern working world, plays a crucial role [19–20].

2.2 Technical Education

According to Banse/Meier [21], technical education encompasses both the process and the outcome of all processes whose goal and purpose is to convey knowledge and understanding of technical systems as well as their creation and use in everyday contexts, with a focus on "knowledge as insights into technical structures and processes) [...] [as well as] skills as technically relevant abilities and competencies" [21]. The subject of technical education is technology, understood as artificial, purposeful, and material as well as immaterial objects and processes. Technology sciences examine technology in terms of its structure and function, its consequences for the environment and society, as well as its socio-cultural origins and contexts of use [(Fig. 4)].

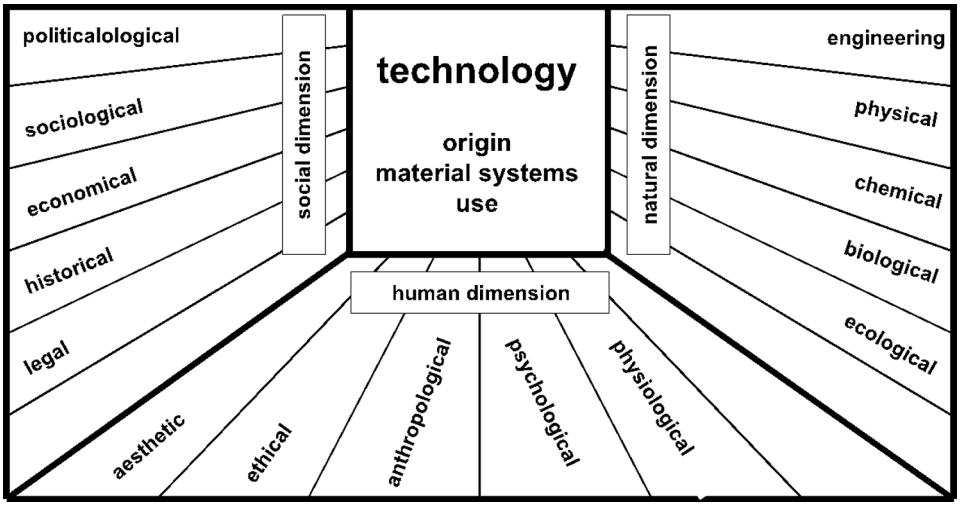


Figure 4: Dimensions and cognitive perspectives of technology [22]

This involves the entire life cycle of technology, that is, its conception, production, use, and disposal or recycling" [23]. Ropohl [22] refers to technology as "[...] when objects are artificially made by humans and used for specific purposes [...] Technology includes (a) the set of utility-oriented, artificial, tangible entities (artifacts or technical systems), (b) the set of human actions and facilities in which technical systems are created, and (c) the set of human actions in which technical systems are used [(Fig. 4)]". Technology describes the interactions between the creation and use (sociotechnical system) of technical artifacts (technical systems) and the resulting consequences for nature (natural dimension), humans (human dimension), and society (social dimension) (Fig. 4). Tech-

nology is "[...] always bound to a set of conditions, consisting of nature, humans, and society, and has effects on these areas [...]" [24].

It is characteristic of technology that it is always purpose-bound and represents the result of a problem-solving process, which always involves a compromise between what is technically feasible, scientific laws, economically viable, ecologically acceptable, and socially accepted (ebd.). From this, the natural, human, and social dimensions can be derived with the corresponding knowledge perspectives of sociotechnical systems (human-technology-environment system) (Fig. 4, Fig. 5) [22].

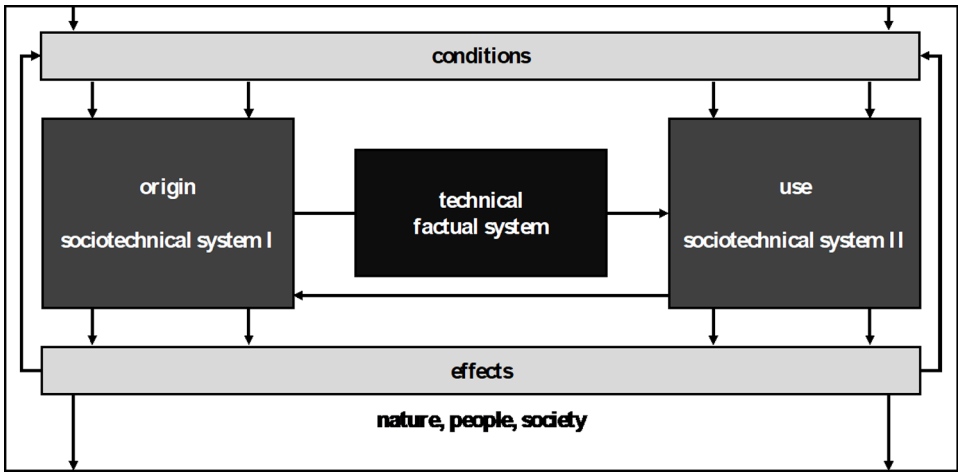


Figure 5: Abb. 5: Scheme of technological problems [22]

The natural dimension describes that all technical artifacts are subject to natural laws, with the most advanced technology not only being reduced to this [22]. The human dimension characterizes, as already described, the human being, who is both the purposeful creator and user of technology [22]. The social dimension shows the overall societal reference, as technical artifacts naturally are subject to societal conditions, rules, and mechanisms and in turn influence them [22].

In summary, Ropohl [22] states: "[...] Technology does not fall from the sky, but it emerges within natural conditions from human actions and social relations. (b) Technology does not lead an isolated life of its own, but it always has specific consequences for the natural ecosystem and human ways of life: Every invention is an intervention, an intervention in nature and society [...]" [22]. Technical education thus has the task of ensuring the corresponding competencies. The VDI [25] has specifically established various standards for technical education to promote educational and didactic development in technical education. The competency areas of the VDI's educational standards are interrelated and can be divided into five subject areas. These include the competency areas of understanding technology, developing technology, using technology, evaluating technology, and communicating technology. Together, these competency

areas form technical action competence, which should be promoted and deepened through technical education [25].[2]

2.3 Approach for Technical Education for Sustainable Development (TESD)

Considering the key concepts of technical education, it can be characterized by focusing on manual work, key competencies, industry and production, an understanding of technology as applied natural science, technical problem and action areas, future technologies or basic innovations, the relationship between natural science, technology, and society, as well as general technology as core aspects [26].[3] The "Common Reference Framework Technology (GeRRT)" postulates within the category "Effects and Consequences of Technology Development and Use in the Past, Present, and Future" that "[...] humans and society must take responsibility for the consequences of technology development and use [...]" [27]. This demonstrates that the dimensions and perspectives of technology [22] (Fig. 1) already encompass the dimensions of the concept of sustainability [16] as well as aspects of Education for Sustainable Development (ESD) BNE [28,15], indicating that technical education can play a crucial role within ESD [29]. Through the concept of Technical Education for Sustainable Development (TBNE), the approaches, concepts, and models of technical education can be linked with those of (Vocational) Education for Sustainable Development. Technical Education for Sustainable Development means that the subject area of "technology" must always be considered in terms of the economic, ecological, and social consequences of decision-making and action alternatives in order to support the development of evaluation, design, and system competencies in young people. It is important to design the learning content in a way that motivates and enables young people to think and act in a sustainability-oriented manner. This, in turn, means that young people must apply their knowledge of sustainable development and recognize problems of non-sustainable development in order to draw conclusions about ecological, economic, and social developments in their interdependence from present analyses and future studies, and make informed decisions based on them, understand and implement them, in order to subsequently realize sustainable development processes [29]. Based on the theoretical considerations of Technical Education for Sustainable Development (TBNE), the designed, developed, and tested situated teaching-learning arrangements aim to promote evaluation, design, and system competencies in dual vocational and technical training occupations. The methodological approach is characterized by a design-oriented research approach [30]. This approach involves the creation of knowledge through a mutual learning process between academic and practical knowledge. It is not only about the theoretical development of innovations or the theoretical conception of teaching-learning arrangements, but also about the simultaneous implementation and application of the developed teaching-learning arrangements in practice, specifically within the dual vocational education at the workplace. In addition to understanding, describing, and explaining prac-

2 A detailed explanation of the individual competency areas with examples and tasks can be found in the VDI publication "Educational Standards Technology for the Intermediate School Leaving Certificate" [25].

3 There are numerous scientific publications on the various technology didactic approaches, concepts, and models [u. a. 32, 21, 33, 34, 22, 24].

tice, the design and development of teaching-learning arrangements are also research objectives. The approach is participatory, practice-oriented, and application-oriented and involves all stakeholders [31]. The development of skills in the professional environment and orientation towards practical and operational contexts are the methodological-didactic guiding principles of TBNE concepts. Within the didactic design of teaching-learning arrangements, situations are created and transferred into learning formats that are as realistic, problem-based, authentic, and complex as possible. They enable a dynamic interplay between action and thinking, active engagement, and reflection. The teaching-learning arrangements are based on didactic principles such as competency orientation, situation- and action-orientation, Constructivist Approach (Situated Learning) [35]. The didactic approach of Situated Learning favors the idea that all prepared content enables learning oriented towards work processes or work contexts. At the same time, it is important to consider not only apprentices but also teacher education students, teachers in vocational schools, as well as training personnel in companies and in inter-company training centers. These target groups must be qualified in relevant modules to apply knowledge about sustainable development and recognize problems of non-sustainable development; that is, to draw conclusions from current analyses and future studies on ecological, economic, and social developments in their interdependence and make decisions based on them to understand and implement processes that lead to sustainable development. Only training personnel who possess design competence themselves will be able to transfer this to apprentices within the framework of company training. The following chapter gives some examples from the Chair of Engineering Pedagogy and Didactics of Technical Education at Otto-von-Guericke University Magdeburg for developed teaching units in the case of Technical Education for Sustainable Development (TESD).[4] The following examples are based on the content and requirements defined in the (company) training regulations for dual vocational training programs for "Food Technology Specialist" and "Baker".[5] The training regulations are legally binding. The training company must adhere to the training regulations and the training framework plan and define your training content accordingly.

2.4 Examples for Technical Education for Sustainable Development (TESD)

2.4.1 Module "The Raw Material Sugar"

Within the module "The Raw Material Sugar," apprentices develop a company-specific sustainability concept. The module is divided into four sub-modules, each forming self-contained units. In Submodule 1: "Sugar Production," apprentices explore different types of sugar. They are tasked with creating profiles for the most important sugar plants and comparing them. This gives them an overview of the advantages of each plant, the production methods, and allows them to decide at the end of the submodule which type is better from a sustainability perspective. Submodule 2: "Ecological and

4 More examples under: https://open-science.ub.ovgu.de/browse/author
5 More example for training regulations under: https://www.bibb.de/de/40.php.

Social Sustainability of Sugar" focuses on health, working conditions, fair wages, and the use of pesticides in sustainability. Apprentices compare working and cultivation conditions of sugarcane and sugar beet in this submodule. Organizations and companies try to convey sustainability to customers through seals and labels, leading to a plethora of seals that few people understand. Therefore, apprentices are tasked with examining and categorizing various seals. In Submodule 3: "Sugar in Everyday Life and Alternatives," apprentices gain an understanding of the amounts of sugar in conventional foods from the confectionery department. This is visually complemented by a domino game. They then delve deeper into the subject with various questions and learn about new alternatives to regular household sugar. The goal is to raise awareness among apprentices about sugar and sharpen their everyday perception. With the newfound range of alternatives, they can expand their cooking and baking habits and influence their health. The final Submodule 4: "Action Options for Sustainable Sugar Production" aims to strengthen apprentices' awareness regarding the three dimensions of sustainable actions. They examine the entire value chain from sugar beet or cane harvesting to transportation, processing, and sales, considering their own training company's sustainability processes. Additionally, they gain insight into the largest company in terms of sugar production and compare their results with its concepts.

2.4.2 Module "Packaging in the Production Process"

The module "Packaging in the Production Process" focuses on the sustainable handling of resources using packaging materials as an example. In the first year of training, apprentices are introduced to the topics of raw materials and quality management. The teaching-learning arrangement builds on this knowledge and aims to raise awareness among apprentices for sustainable sourcing and handling of raw materials. This arrangement is implemented with the primacy of the Anchored Instruction approach within the situated learning methodology. The significant complexity associated with the use of plastics is illustrated to apprentices at the beginning of each learning scenario through a video. Both videos vividly describe the issues related to health impacts from additives in food packaging and manufacturing processes, inadequate recycling, and the environmental consequences associated with plastics. Similarly, these videos aim to develop action strategies in the apprentices' work area to reduce local and global impacts. The entire complexity related to ecological and social burdens is broken down into interconnected sub-problems through the teaching-learning arrangement. Instructions and questions on worksheets guide apprentices from simpler to more complex issues, promoting active reflection and option-oriented consideration of acquired knowledge. Submodule 1: "Health Hazards" aims for apprentices to sustainably modify the manufacturing and packaging process in their company to minimize health risks associated with plastic use. Here, ecological factors are particularly emphasized. Submodule 2: "Global Impacts" aims for apprentices to sustainably modify the packaging process. Specifically, they are tasked with identifying hard-to-recycle plastic materials, replacing them with easily recyclable materials, and critically evaluating and reflecting on their findings.

2.4.3 Module "Digitalization in Vocational Training in the Food Industry"

The module "Digitalization in Vocational Training in the Food Industry" includes the effects and characteristics of changes triggered by digitalization processes. In the first year of training, apprentices have already come into contact with this topic. The teaching-learning arrangement builds on this knowledge and aims to educate apprentices about the impacts and digitized work processes. This arrangement is implemented using the Anchored Instruction approach of situated learning. To make the impacts of digitalization understandable, apprentices are shown the complexity of changes through learning videos at the beginning of each learning scenario. The module "Digitalization in Vocational Training in the Food Industry" vividly describes the issues related to the impacts on work processes and routines, as well as dealing with new processes and the use of innovative techniques and machines. Similarly, it aims to develop action strategies in the apprentices' work area to allow them to be able to implement and utilize digital solutions in their daily work. The entire complexity of the topic, resulting from advancing automation and digitalization, is broken down into interconnected sub-problems through the teaching-learning arrangement. Submodule 1: "Understanding Digitalization" aims to show apprentices to what extent digitalization affects their private lives and everyday work processes. The focus here is particularly on understanding the impacts of digitalization on processes in manufacturing industries. Submodule 2: "Digitalization and Security" aims for apprentices to become familiar with digital tools and devices in a digitized work environment. The focus here is particularly on cybersecurity risks when using digital devices. Submodule 3: "Work Process Optimization" aims for apprentices to understand which processes are changed by digitalization and how this impacts their daily work routine. In particular, they should be able to explain certain phenomena of digitized production and identify individual impacts.

3 Conclusions and outlook

The approach of Technical Education for Sustainable Development (TBNE) presented here is characterized by the integrated teaching of technical and sustainability-oriented skills with the individual dimensions of sustainability (ecological, social, economic) not viewed in isolation but holistically within the situated teaching-learning arrangements. Thus, the facets of the sustainability triangle form the basis for the implementation of sustainability-oriented situated teaching-learning arrangements. This involves primarily promoting evaluation, design, and system competencies [11]. Through the TBNE concepts, young people are expected to learn to apply knowledge of sustainable development, recognize issues of non-sustainable development, draw conclusions about ecological, economic, and social developments in their interdependence, and make decisions based on them. At the same time, in addition to the low-threshold STEM offerings in children's and youth centers, it is important to establish "latent" connections to technical education. Technical education in general schools in Saxony-Anhalt aims to

develop a solid understanding of the development and use of technology, "[...] its cognitive and practical prerequisites as well as its consequences for the environment, economy, and society [...], create cognitive prerequisites for innovation in technology and application of technical knowledge [...], and lay the foundations for reflecting on their implications and consequences [...]" [23]. On one hand, technology is a central theme of sustainable development, while on the other hand, competencies for sustainable thinking and acting are a key requirement of the future labor market.

Education for Sustainable Development (ESD) encompasses all activities that empower people to think and act in a sustainable manner, enabling them to understand the impacts of their actions and make responsible decisions [36]. To achieve this, the acquisition and early promotion of system, evaluation, and design competencies are central goals. Technical education is attributed a key role in achieving the goals of ESD against the backdrop of the constant changes in requirements in the modern world. The concept of Technical Education for Sustainable Development (TBNE) integrates the goals, content, and methods of technical education with education for sustainable development. Building on these theoretical considerations, the Chair of Engineering Pedagogy and Didactics of Technical Education at Otto-von-Guericke University Magdeburg has developed an action concept that actively shapes the socio-ecological transformation process in the region at operational and strategic levels. The concept focuses on two strategic pillars: embedding the TBNE concept directly into (vocational) teacher training and further development through vocational educational research and development projects. The activities carried out within these two pillars are to be understood as pilot projects characterized by innovation partnerships between academia and practice [37], aiming to change practices by integrating sustainability into educational practices.

In summary, it can be noted that through the TBNE approach, teacher education students for vocational schools and company trainers are qualified to develop sustainability-oriented teaching-learning arrangements, thereby promoting their own sustainability competencies. Within these teaching-learning arrangements, teacher education students, apprentices, and trainers learn to apply knowledge about sustainable development and recognize problems of non-sustainable development; that is, to draw conclusions from current analyses and future studies on ecological, economic, and social developments in their interdependence and make decisions based on them to understand and implement processes that lead to sustainable development. By developing and implementing these concepts, teacher education students, apprentices, and trainers are activated to develop their own approaches and enable a dynamic interplay between action and thinking, active engagement, and reflection, thereby promoting evaluation, design, and system competencies.

References

[1] Grunwald, Armin/Kopfmüller, Jürgen (2022): Nachhaltigkeit. 3., aktualisierte und erweiterte Auflage. Campus Verlag (= Campus Studium).

[2] Enquete-Kommision (1998): Konzept Nachhaltigkeit. Vom Leitbild zur Umsetzung. Abschlussbericht der Enquete-Kommission „Schutz des Menschen und der Umwelt – Ziele und Rahmenbedingungen einer nachhaltig zukunftsverträglichen Entwicklung" des 13. Deutschen Bundestages. Bonn.

[3] Diettrich, A., Hahne, K., & Winzier, D. (2007). Berufsbildung für eine nachhaltige Entwicklung: Hintergründe, aktivitäten, erste ergebnisse. *Berufsbildung in Wissenschaft und Praxis, 36*(5), 7–12.

[4] UN, United Nations (2015): Vereinte Nationen (2015): Transformation unserer Welt. Die Agenda 2030 für nachhaltige Entwicklung. Online unter: http://www.un.org/depts/german/gv- 70/band1/ar70001.pdf.

[5] Rockström, Johan/Sukhdev, Pavan (2016): How food connects all the SDGs. Stockholm. Online unter: https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html.

[6] Pufé, Iris (2017): Nachhaltigkeit. 3., überarbeitete und erweiterte Auflage. Konstanz München: UVK Verlagsgesellschaft mbH mit UVK/Lucius. (= utb Wirtschaftswissenschaften, Sozialwissenschaften 8705).

[7] Nachbagauer, Andreas (2015): Charakterisierung eines Begriffes der sozioökonomischen Nachhaltigkeit für Headquarterstandorte.

[8] Kuhlmeier, Werner/Mohorič, Andrea/Vollmer, Thomas (2014): Berufsbildung für nachhaltige Entwicklung Modellversuche 2010–2013. Erkenntnisse, Schlussfolgerungen und Ausblicke. Bertelsmann. (= Berichte zur beruflichen Bildung).

[9] Melzig, Christian/Hemkes, Barbara/Fernández Caruncho, Verónica (2018): Wissenschafts-Politik-Praxis-Dialog zur Umsetzung einer politischen Leitidee. Erfahrungen aus den Modellversuchen zur „Berufsbildung für nachhaltige Entwicklung 2015–2019". In: Berufsbildung in Wissenschaft und Praxis (BWP) 6, pp. 35–39.

[10] Hemkes, Barbara (2014): Vom Projekt zur Struktur – Das Strategiepapier der AG „Berufliche Weiterbildung". In: Kuhlmeier, Werner et al. (Eds.): Berufsbildung für nachhaltige Entwicklung: Modellversuche 2010–2013; Erkenntnisse, Schlussfolgerungen und Ausblicke. Bertelsmann Verlag GmbH & Co. KG. pp. 225–229. (= Berichte zur beruflichen Bildung).

[11] Rost, Jürgen (2005): Messung von Kompetenzen Globalen Lernens. In: Zeitschrift für internationale Bildungsforschung und Entwicklungspädagogik 2, pp. 14–18.

[12] Bader, Reinhard/Müller, Martina (2002): Leitziel der Berufsbildung: Handlunskompetenz. Anregungen zur Ausdifferenzierung des Begriffs. In: Die berufsbildende Schule. pp. 176–182.

[13] Kastrup, Julia/Kuhlmeier, Werner/Strotmann, Christina (2021): Berufsbildung für eine nachhaltige Entwicklung: Hintergründe, Aktivitäten, erste Ergebnisse. In: BWP, Berufsbildung in Wissenschaft und Praxis, pp. 24–27.

[14] Haan, Gerhard de (2008): Gestaltungskompetenz als Kompetenzkonzept der Bildung für nachhaltige Entwicklung. In: Bormann, Inka/Haan, Gerhard de (Eds.): Kompetenzen der Bildung für nachhaltige Entwicklung: Operationalisierung, Messung, Rahmenbedingungen, Befunde. VS. pp. 8–12.
[15] Kastrup, Julia/Kuhlmeier, Werner (2020): Leitlinien für die didaktische Gestaltung der Berufsbildung für eine nachhaltige Entwicklung an Beispielen aus Ernährung und Hauswirtschaft. In: HiBiFo – Haushalt in Bildung & Forschung 2.
[16] Hauff, Michael von/Kleine, Alexandro (2005): Methodischer Ansatz zur Systematisierung von Handlungsfeldern und Indikatoren einer Nachhaltigkeitsstrategie das Integrierende Nachhaltigkeits-Dreieck. Kaiserslautern: TUK.
[17] NPBNE, Nationale Plattform Bildung für nachhaltige Entwicklung/BMBF, Bundesministerium für Bildung und Forschung (Eds.) (2017): Nationaler Aktionsplan Bildung für nachhaltige Entwicklung. Der deutsche Beitrag zum UNESCO-Weltaktionsprogramm. W. Bertelsmann.
[18] Brämer, Stefan et al. (2019): Entwicklung von Nachhaltigkeitskompetenzen in den dualen Berufsausbildungen der Lebensmittelindustrie. In: Juen-Kretschmer, Christa et al. (Eds.): Bildung für nachhaltige Entwicklung. Bad Heilbrunn: Verlag Julius Klinkhardt. pp. 245–249. (= Transfer Forschung ↔ Schule 5. Jahrgang, Heft 5 (2019)).
[19] Buhr, Regina/Hartmann, Ernst A. (2008): Technische Bildung für Alle ein vernachlässigtes Schlüsselelement der Innovationspolitik. Berlin: VDI/VDE-IT GmbH.
[20] Schütt-Sayed, Sören/Zopff, Andreas/Kuhlmeier, Werner (2020): Didaktik gewerblich-technischer Berufsbildung im Kontext der Bildung für nachhaltige Entwicklung. In: Berufsbildung: Zeitschrift für Theorie-Praxis-Dialog 74, pp. 20–22.
[21] Banse, Gerhard/Meier, Bernd/Wolffgramm, Horst (2002): Technikbilder und Technikkonzepte im Wandel – Eine technikphilosophische und allgemeintechnische Analyse. Karlsruhe: Forschungszentrum GmbH.
[22] Ropohl, Günter (2009): Allgemeine Technologie: Eine Systemtheorie der Technik. Karlsruhe: KIT Scientific Publishing.
[23] Kornwachs, Klaus (Ed.) (2013): Technikwissenschaften: Erkennen – Gestalten – Verantworten. Springer. (= acatech IMPULS).
[24] Hartmann, Elke/Kussmann, Michael/Scherweit, Steffen (2008): Technik und Bildung in Deutschland Technik in den Lehrplänen allgemeinbildender Schulen: Eine Dokumentation und Analyse. VDI.
[25] VDI, Verein Deutscher Ingenieure e.V. (2007): Bildungsstandards Technik für den Mittleren Schulabschluss. VDI.
[26] Meier, Bernd (2017): Curriculare Implikationen des Technikbegriffs. In: Sitzungsberichte der Leibniz-Sozietät 131, pp. 93–109.
[27] Graube, Gabriele/Hartmann, Elke/Mammes, Ingelor (2021): Gemeinsamer Referenzrahmen Technik (GeRRT). Technikkompetenzen beschreiben und bewerten. VDI.

[28] Vollmer, Thomas/Kuhlmeier, Werner (2014): Strukturelle und curriculare Verankerung der Beruflichen Bildung für eine nachhaltige Entwicklung. In: Kuhlmeier, Werner/Mohorič, Andrea/Vollmer, Thomas (Eds.): Berufsbildung für nachhaltige Entwicklung Modellversuche 2010–2013. Erkenntnisse, Schlussfolgerungen und Ausblicke. Bertelsmann. pp. 197–223.

[29] Vieback, Linda/Bünning, Frank/Brämer, Stefan (2022): TBNE – Technische Bildung für eine nachhaltige Entwicklung. Aktive Gestaltung der sozial-ökologischen Transformation durch die Förderung eines technikorientierten nachhaltigen Denkens und Handelns in Schule und Ausbildung. In: Binder, Martin/Wiesmüller, Christian/Finkbeiner, Timo (Eds.): Leben mit der Technik. Welche Technik wollen ‚Sie'? – Technik: Verstehen wir, was wir nutzen!? 1. Auflage. Karlsruhe: Deutsche Gesellschaft für Technische Bildung e.V. pp. 118–138.

[30] Vieback, Linda et al. (2020): Vieback, Linda; Brämer, Stefan; Schüßler, Philipp; Malmquist, Tina: Nachhaltigkeit in den Lebensmittelberufen – digitale, situierte Lehr-Lernarrangements zur Förderung der Bewertungs-, Gestaltungs- und Systemkompetenz innerhalb der betrieblichen Aus- und Weiterbildung. In: Digitale Arbeit, digitaler Wandel, digitaler Mensch?: 66. Kongress der Gesellschaft für Arbeitswissenschaft. Dortmund: GfA-Press, C.8.7. In: GFA, Gesellschaft für Arbeitswissenschaft (Eds.): Digitale Arbeit, digitaler Wandel, digitaler Mensch? GfA-Press. pp. C.8.7.

[31] Schemme, Dorothea/Groß, Beate (2011): Reflexive Meta-Evaluation von Modellprogrammen zum betrieblichen Lernen. Abschlussbericht. Bonn: BIBB, Bundesinstitut für Berufsbildung.

[32] Banse, Gerhard/Meier, Bernd (2013): Technische Bildung. In: Grunwald, Armin/Simonidis-Puschmann, Melanie (Eds.): Handbuch Technikethik. Stuttgart: J. B. Metzler. pp. 421–425.

[33] Graube, Gabriele/Theuerkauf, Walter E. (Eds.) (2002): Technische Bildung: Ansätze und Perspektiven. P. Lang.

[34] Fleischer, Lutz-Günther/Meier, Bernd (2017): Technik und Technologie: techne cum episteme et commune bonum Ehrenkolloquium anlässlich des 70. Geburtstages von Gerhard Banse. Trafo Wissenschaftsverlag.

[35] Bünning, F., Brämer, S., Krumbach, J., König, H., Lehmann, J., Martsch, M., & Röhming, M. (2018). *Technikunterricht mit CoSiTo: situiert-multimedial-schülerzentriert*. wbv Media GmbH & Company KG.

[36] BMBF, Bundesministeriums für Bildung und Forschung (2022): Bildung für eine nachhaltige Entwicklung. Berlin: BMBF.

Results of the BMBF project VoCasian

T. Hennige; F. Bünning; M. Martsch

In a scenario where institutions from two different countries decide to cooperate on a sophisticated level, a unique and sometimes unpredictable dynamic arises. It is precisely this dynamic that significantly influences the quality of collaborative outcomes and shapes the course of international cooperation projects.

Funded by the Federal Ministry of Education and Research (BMBF), the VoCasian project was part of the funding line "Promotion of the Internationalization of Vocational Education and Training" (cf. "VoCasian – A framework for TVET PhD programs in Georgia" in this publication). In this regard, the project was not only focused on bilateral cooperation in the field of vocational education with the partner country Georgia (Vocational Education Cooperation), but also placed an emphasis on the planning and initiation of measures for vocational education research to sustainably support local educational structures. Within the framework of the project, an extensive qualitative study was conducted which, in addition to far-reaching findings on the state of the Georgian vocational education system, also provided important information on vocational training needs. The paper at hand outlines the partnership-based development respectively research process between Ivane Javakhishvili Tbilisi State University (TSU) and Otto-von-Guericke-University Magdeburg (OvGU), and presents the resulting, accredited PhD program "Vocational Education".

1 Research Design

In addition to the research objectives underlying the BMBF funding line, the overarching goal of the VoCasian project was to develop and implement a PhD study program in the field of vocational education at the project partner institution TSU. This program should be tailored to the needs of the Georgian (higher) education system while being competitive on an international level.

The initial conceptualization of the PhD study program was achieved through a comprehensive literature review on current development trends and the resulting qualification needs [1]. Particularly noteworthy are the advancements in digitalization and sustainability, which are identified as key drivers that will significantly shape and transform the (vocational) education landscape in the long-term [2]. But according to the Ministry of Education and Science of Georgia's (MoES) reform plans, not only is a content transformation across the entire Georgian vocational education sector being pursued, but also a simultaneous shift in didactic methods [3]. The focus is on loosening the purely school-based training structures by incorporating an increasing amount of practical components. In this context, the German dual TVET system stands out by its

integration of theoretical knowledge and practical skills, which serves as the guiding objective of vocational training [4], alongside the didactic principle of action orientation [5].

In light of the aforementioned development trends as well as action-oriented concepts and methods, a literature review on the status quo of the technical vocational education and training system (TVET) in Georgian as well as TVET research had been conducted (cf. "Status Quo of TVET System and TVET Strategy in Georgia" in this publication). Due to the lack of relevant and comprehensive studies, an empirically supported ex-ante needs analysis was carried out. This analysis was conceptualized following the *Key variable model of sustainable VET centers* as proposed by Stockmann [6]. Stockmann [6] emphasizes several critical aspects for the successful implementation and sustainability of TVET centers or programs justified by the fact that individual elements, concepts, or system components of foreign education systems cannot be directly transferred to other countries without adaptation. They must be tailored to fit the educational, economic, and social conditions and goals of the recipient country. Using a balanced scorecard approach, Stockmann evaluated around 80 individual projects and proposed a generalized sustainable model based on the four key variables *system compatibility*, *flexible management system*, *ownership* and *staff* (cf. fig. 1)

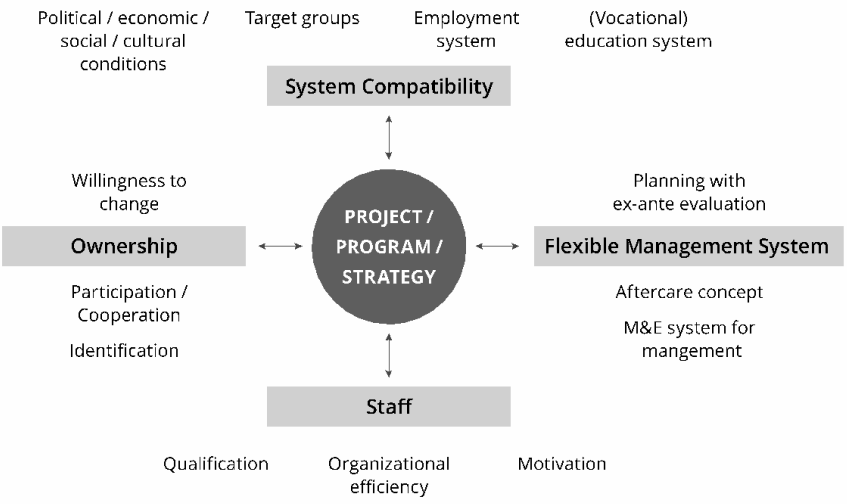


Figure 1: Key variable model of sustainable VET centers developed by Stockmann [6]

The model was of fundamental importance for the program management and the transfer strategy of VoCasian as the Stockmann approach ensured that the targeted PhD program is well-aligned with both the evolving educational needs and the specific context of the Georgian TVET system.

Applied to the study program, the ex-ante evaluation – utilizing a *flexible management system* – was conducted through expert interviews with shareholders and stakeholders. All relevant target groups, including teaching staff, trainees, and companies, were addressed regarding their *system compatibility* (cf. fig. 1). Building on the preliminary work focusing on megatrends, didactics, and other factors, a transnational conception of the interview guide was developed, emphasizing *ownership* and *staff*. The guided interviews were conducted online with the assistance of a Georgian-English translator, involving a total of 12 participants (N = 12).

1.1 Development of category system

The interview data was transcribed and analyzed using qualitative content analysis (structuring; [7]). The structuring content analysis follows the deductive category application approach, which aims at applying predefined categories to textual material. The approach involves systematic and theory-driven procedures to structure and analyze empirical content whereby the following steps need to be taken into account (ibid.):

Theory-based Category Formation: Before the analysis begins, categories are developed based on theoretical considerations and existing research literature. These categories are compiled into a category system.

Definition of Categories: Each category is precisely defined to clarify its content and scope of application including coding rules to enhance reliability.

Text Work and Coding: The text material to be analyzed is worked through step by step. Sections of the text are assigned to the predefined categories. This is done through systematic and traceable coding of the material.

Review and Adjustment of Categories: During the analysis, it may be necessary to adjust the categories and coding rules. These modifications are based on insights gained from the text material and serve to refine and improve the category system.

Evaluation and Interpretation: After coding, the assigned text sections are evaluated and interpreted. The theoretical foundation is considered to draw conclusions related to the research objective.

In the sense of Mayring's approach and within the framework of the needs analysis, six main categories were determined based on theoretical and general literature review. These specific categories were then confirmed respectively adjusted during coding process:

1. TVET System
2. Teaching Methods
3. Impact of the Economy
4. Digitalization
5. Sustainability
6. Higher Education/PhD program

Thereupon, each category was differentiated into further sub-categories, e. g. *Governmental Strategy*, *TVET Programs* and *Quality Assurance* are subordinate to TVET System, or Teaching Methods is further differentiated into *Student Skills Development*, *In-*

company Training and *Qualification of TVET teachers*. Each category or sub-category is supported by anchor examples.

A (more) detailed classification and interpretation of the transcribed interview data is provided in the following chapter.

1.2 Data Analysis

After analyzing the collected data, the initial findings are rather sobering: Despite the extensive transformation processes initiated in the Georgian TVET system in recent years (cf. "Status Quo of TVET System and TVET Strategy in Georgia" in this publication)., these efforts do not (yet) appear to have impacted the demand for well-trained professionals in the economy.

> "We recruit young people [...] and they are [...] aware of nothing in this field they are young [...] because everything is better not to know anything than know something but wrong information [...] so it's better to start from zero" (Expert 12).

This statement from the interview with an economic representative in his role as a company founder with years of experience highlights his dissatisfaction with the current state of the Georgian TVET system. Other enterprise experts share the perception that despite the government's long-standing efforts to consider labor market developments, particularly through education reforms, companies are still struggling to find well-trained personnel, if they can find any at all. TVET institutions are often confronted with the accusation that "the skills of the students gained during this teaching process do not fully meet requirements of the labor market in the end finally when they leave institutions and go to labor market still there is some mismatch between the skills gained and the requirements that are covered" (Expert 2). As a result, the companies themselves are becoming inventive, developing their own training methods (e. g. mentoring programs), establishing continuing education systems, or acquiring the urgently needed expertise from abroad.

2 TVET System

Although the implementation still holds potential for development, the ministry has already set the course for a modern and industry- respectively practice-oriented vocational education and training system through strategy papers [3, 8]. Focus lies on the structure and design of the different TVET programs, which in the future will not be subject-based but modular- and competence-based. Additionally all training programs should include work-related learning and also be adapted to the conditions of the National Qualifications Framework (NQF) (Expert 5). This, in turn, is being developed in accordance with the European Quality Framework for Vocational Education (EQAVET). Among other things, "the new Agency of Skills Georgia [...] was established and this organisation aims to take all responsibilities throughout the VET system" (Expert 6). Quality assurance should also be carried out through a standardized development

process of TVET programs. The strategy envisions that an occupational standard will be initially developed, from which learning outcomes will be derived. The TVET institutions will then use this standard to design their own programs. However, one expert limits the reform ambitions by stating that "it's not enough to have good infrastructure, qualified teachers, and so well-developed programs, it's not enough [...] without international support we cannot achieve let's say nothing because our resources in vocational education are very limited" (Expert 5).

However, the ministry's approaches are not only met with approval. According to some experts, the strategy and reform plans do not go far enough, because "not only strategy I think sometimes we have not educational policy in our country" (Expert 3). Moreover – and despite the ambitious reform plans – the centralization of TVET in Georgia is seen as a significant inhibiting factor for the creation of a sustainable TVET system. Policy decisions regarding vocational training seem to remain exclusively in the hands of the ministry, leaving businesses and educational institutions with minimum influence over the formal and content-related aspects of TVET programs. Apparently, it reveals a large gap: While at political level "we ensure that at the very early stage when we start to develop a certain program we hear the voice of business" (Expert 6), the business side does not confirm this view: "I will say that universities and educational systems in Georgia are not flexible enough to ask the market what you want and adapt their programs according it" (Expert 10).

Particularly those experts with a pedagogical background in the field of TVET criticize the fact that theory and practice, in this case reform and implementation, are far removed from innovative, future-oriented program offerings that account for changes in the labor market. The "trends of the labor market should be tracked very closely because the trends change [...] new professions become more demanded [...]" (Expert 2). However, these new training professions are crucial for establishing vocational education and training at the core of Georgian society. Several experts mention that Georgia has an oversupply of academics, and the decision to pursue vocational training is driven almost exclusively by the desire for job security. Many TVET institutions aim to equip their trainees with both theoretical and practical knowledge but the practical component typically takes the form of laboratory instruction, although the trainees surveyed would like to see "more apprenticeship in the real work place and not only in the laboratory" (Expert 9) and that "practical parts would be more and more" (Expert 8).

Funding is a big issue, which means that funding of the TVET programs is highly dependent on whether an institution is state-funded or privately established. It also affects the payment of teachers, and the search for suitable personnel often fails, not least because of lacking salaries. "[...] if we want a very well qualified teacher to come to us from the sectoral field [...] they have great careers and in the system of Georgian funding for vocational teachers there are not enough resources to invite those qualified persons" (Expert 1).

2.1 Teaching methods

Both technical and pedagogical qualifications of TVET teachers are key to providing high-quality education that produces highly skilled and capable graduates but "the skills of the students gained during this teaching process don't fully meet requirements of the labor market in the end finally" (Expert 2). Often, it remains an attempt to equip trainees with practical skills so that they can find a corresponding job after graduation (Expert 1): "In my profession we only have like theoretical examples and practical examples but not the practice or practice component [...] so I would like to have more practical as my main aim is to get employed in this field" (Expert 8).

The limited presence of practice-oriented TVET concepts stems from a lack of cooperative structures and comprehensive teacher qualification. While technically proficient, teachers often lack essential pedagogical competencies, as methodological and didactic skills are given secondary importance in their education. The government is also pursuing approaches to standardize vocational teacher training and ensure pedagogical quality, while simultaneously making it more attractive. "First of all, they need to be field specialists [and] we have mechanisms for verification which means that we are not only measure their process while teaching but also we check their progress on different stages" (Expert 4). The selection and training process is to be supervised by specialists (e. g. form the Skills Agency) who, at the same time, ascertain if TVET programs are "in line with the educational standards requirements if the teaching staff is suitable if the VET institution has suitable material resources to implement this program if they have the teaching plan if they have the assessment system what kind of teaching methods will they use during the process and stuff like that" (Expert 6).

The future will show how promising these approaches are. To make matters worse, the reputation of vocational school teachers and apprenticeships in general is very low. Elevating the prestige of TVET and the reputation of vocational teachers in Georgia remains a task for the entire society.

2.2 Impact of the Economy

The economic factors influencing the design and content of the TVET system are closely linked to the insights in the section *TVET System*. According to some experts, the economy is not sufficiently involved and has little opportunity to shape the development of individual TVET programs. TVET Teachers, in particular, wish that "[...] representatives of the industry [...] should be involved in the process both of the development of our curriculum and also implementation of teaching and learning process" (Expert 3). They recognize that the partnership between the economy and educational institutions is even more important in the field of TVET than in the academic sector (Expert 2).

Again, there is a significant discrepancy between the aforementioned assessments and the plans and efforts of decision-makers. "To ensure this linkage between labor market we elaborated some mechanisms and some tools for it" (Expert 6). The same expert further explains that all stakeholders are involved in the process of curriculum development for both existing and new TVET programs, including employers and employer associations, representatives of business associations, and state institutions, as

well as representatives of educational institutions. "PPP [Public-Private Partnership]-based vocational schools which were established [...] for example in construction sector for example in tourism sector and railway transport sector" (Expert 5) seem to be more the exception than the rule.

The interviewed business representatives use very clear language: The TVET system is described as being disconnected from the economy and, consequently, from the labor market. The knowledge conveyed seems antiquated, and practical vocational preparation is either inadequately implemented or not implemented at all. In addition to inadequate structures and materials, it is explained that "professional associations in Georgia are almost built from zero so not very competitive because they lack human resources there are not enough lecturers [...] qualified lecturers for them" (Expert 12), which aligns with the statements from the section on *Teaching Methods*.

2.3 Sustainability

The results of the interview data regarding sustainability are almost alarming:

"Sustainability I think is not part of our curricula it's just an idea written in government policy and government papers" (Expert 3).

Looking at the megatrends it becomes clear that, beyond the strategic level, sustainability is effectively not a topic, as hardly any expert can provide an in-depth contribution to the related interview questions. Only the business experts unanimously confirm that "[...] sustainability is very crucial for our country and for our business industry [...] so it would be better to be more sustainable in these directions so the business can develop and enhance properly" (Expert 12).

2.4 Digitalization

Digitalization is also considered a most relevant factor for the future. "So the technological progress has a big impact on every field of our life especially in the education [...] when you are a student you need to have those skills which are necessary to get involved in this educational process and adapt on the innovation technologies and other developments." (Expert 8).

At the same time, many experts emphasize that the material and professional equipment with relevant technology and the implied competencies is the greatest weakness of the (vocational) education system in Georgia. Many teachers cannot meet the requirements of modern technologies, so that "a significant part of them [...] don't have relevant skills to use those technologies and this is a prior issue for us in planning a study process here" (Expert 1). Furthermore, regional disparities exist in Georgia concerning basic requirements like a stable internet connection. In the more rural areas, where many vocational schools are situated, the infrastructure is poorly equipped to meet the challenges of technological progress.

The Covid-19 pandemic has revealed many shortcomings in the field of digitalization: "[...] when pandemic started the teaching process in our center was suspended because the teachers and also students were not ready for those changes" (Expert 1) but "in fact the pandemic showed us that we have to get used to the technological developments and study what's new and implement it in our reality" (Expert 4). In this case,

Cloud technology, Artificial Intelligence (AI) and 3D printing are recognised as particularly relevant technologies, especially for the economy (Expert 11).

2.5 Higher Education/PhD program

Regarding higher education, some rather general information could be obtained from the data material. Both business experts and university as well as ministerial actors agree that the attractiveness of study programs – like that of TVET programs – must be increased. According to the experts, this can only be achieved if the academic training is structured in such a way that it prevents "talented people [...] try to do their Master's degrees outside of Georgia" (Expert 12). Additionally, to pave the way for an academic career within the Georgian higher education system, demand-oriented doctoral programs are needed. The higher education reform envisions far-reaching development goals, such as the redesign of PhD programs, which are oriented towards sectoral benchmarks for specific learning fields (Expert 6). These are then adapted to national and individual institutional conditions: "[...] we have a national qualifications framework in the country and internal university requirement document which should be taken into consideration while developing the doctoral program" (Expert 1). This allows for the pursuit of (local) research approaches and the training of scientific specialists in the respective fields, which also applies to the TVET sector.

At the time of the expert interviews, a PhD program focusing on vocational education and training did not yet exist.

3 PhD Vocational Education

Drawing from the outcomes of the expert interviews and the insights on megatrends, as well as methods and didactics in Georgian vocational education and training, a PhD program tailored to demand was developed considering the economic, social, and labor market-specific needs of the target country. The program structure includes 35 ECTS, with 25 ECTS dedicated to mandatory courses and an additional 10 ECTS for elective courses to enhance the students' academic profiles. The compulsory courses emphasize methodological and structural aspects, while the elective courses address international TVET megatrends, such as sustainability and digitalization. The Georgian project partners determined the number of ECTS and the standard study duration (two years) during the accreditation process. The ECTS allocation is based on the number and content of the modules, as well as the anticipated student workload per module (cf. fig. 2). Since the PhD program is divided into teaching and research components, ECTS are awarded only for the teaching component (modules).

Regarding *ownership* and *personnel* [6; cf. also fig. 1], the Georgian partner university was actively involved in the conceptual work from the beginning. They were responsible for ensuring the study program's alignment with legal requirements, regulations, and the university's own guidelines. Figure 2 illustrates the final design of the *PhD Vocational Education* program framework.

	Mod. Nr.	Module title	ECTS
Obligatory (25)	1	Vocational Education Scientific Genesis and Theories	5
	2	Research Methods and Methodology in VET Education I	5
	3	Research Methods and Methodology in VET Education II	5
	4	Doctorate Seminar	5
	5	Assistantship to the professor	5
Elective (10)	6	Human Resource Development and Personnel Development	5
	7	Vocational Education for Sustainable Development	5
	8	Teaching and Learning in Natural and Virtual Learning Environments	5
	9	Teaching and Learning Methods	5
		Research Project 1	
		Research Project 2	
	10	Thesis	

Figure 2: Concept of the PhD *Vocational Education* study program

The syllabi for the individual modules were also developed in close collaboration with the Georgian partner university, supported by German lecturers. These syllabi include prerequisites, learning objectives, teaching/learning methods, learning outcomes, and essential literature, which is provided to the Georgian students in the form of readers.

The following overview and corresponding explanations outline not only the structure and content of the *PhD Vocational Education*, but also demonstrate how it incorporates and practically implements the research findings.

Module 1 directly addresses the issue of a holistic understanding of technical and vocational education and training, of TVET approaches and (international) developments, as well as TVET systems and their (legal) frameworks. The syllabus entails a high density of information, furthermore external expert contributions and group work or group discussions [9].

Since the PhD program is non-consecutive, *VET Scientific Genesis and Theories* establishes the foundation and a common basis upon which discussions and research approaches can be built throughout the course of the program.

Module 1

Title of the teaching course	VET Scientific Genesis and Theories
Status of the Course	1. Faculty of Psychology and Educational Sciences
	2. PhD Program Vocational Education
	3. Mandatory
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 95 h.
Prerequisites	NA
Goals of the teaching course	The aim of this course is to equip students with the necessary knowledge for scientific theories and structures of vocational education as well as the skills for comparing and reflecting current issues of vocational education and working out a VET conception within an institutional context.

Figure 3: Module 1 key information [9]

Module 2

Title of the teaching course	Research Methods and Methodology in VET Education I
Status of the Course	1. Faculty of Psychology and Educational Sciences
	2. PhD Program Vocational Education
	3. Mandatory
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 hours (Seminars) Students' independent working hours: 95 hours
Prerequisites	NA
Goals of the teaching course	The aim of this course is to equip students with the ability to get familiar with the common theories, methods and instruments of VET research and the skills to weigh different approaches for the own thesis as well as to apply them to a VET research question.

Figure 4: Module 2 key information [9]

Two of the most important modules, and therefore weighted with 10 ECTS in total, are method modules 2 and 3. The trial period of all modules prior to accreditation has, through informal feedback meetings with lecturers, revealed that students' skills in the area of empirical research methods do not yet reach the desired level of competence, consequently limiting their research and publication capabilities.

Research Methods and Methodology in VET Education has a strong practical focus without neglecting the imparting of solid methodological knowledge. The module is divided into two parts, with part I focusing on the fundamental differences between qualitative and quantitative research approaches and clearly assigning them to different research questions. Through a self-selected mini research project, which students choose and work on, they gain valuable experience in empirical work that they can immediately use and apply in preparation of their PhD thesis [9].

Module 3

Title of the teaching course	Research Methods and Methodology in VET Education II
Status of the Course	1. Faculty of Psychology and Educational Sciences
	2. PhD Program Vocational Education
	3. Mandatory
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (155 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 125 h.
Prerequisites	Students need to have previously taken the following course: Vocational Education Research Methods I
Goals of the teaching course	The aim of this course is to reinforce basic research methods and equip students with further advanced quantitative and qualitative methods in order to apply them to a current research example. We will apply the research methods practically using real data sets with the software programs SPSS (for quantitative analysis) and MAXQDA (for qualitative analysis).

Figure 5: Module 3 key information [9]

The second part of the method module builds upon the basic knowledge acquired in part I and delves into current research approaches in the (international) vocational education landscape. Students are, again, actively engaged in the lectures as they learn to use the analysis tools SPSS, R (free version), and MAXQDA, that they can apply to their own research projects.

The high relevance of Modules 2 and 3 arises not least from the deficiencies in the area of study-based Georgian TVET research, which are presented elsewhere (cf. "Status Quo of TVET System and TVET Strategy in Georgia" in this publication).

An important aspect is the creation of the Assistantship and Seminar modules, both of which are integral parts of a Georgian PhD program. *Assistantship to the professor* ensures the readiness for teaching, involving the assistance of professors in their activities, the training on teaching materials, and to enhance the understanding of content and applied didactics. *Doctorate Seminar*, on the other hand, resembles a doctoral colloquium where doctoral candidates receive collegial guidance and advice.

Module 4

Title of the course	Assistantship to the professor
Course status	1. Faculty of Psychology and Educational Sciences
	2. PhD Program Vocational Education
	3. Mandatory
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 22 h. Students' independent working hours: 103 h.
Prerequisites	None
Objectives of the training course	Purpose of the course is a doctoral student formation to ensure activity readiness for teaching and a comprehensive understanding of the scientific as well as higher education debate, learning and teaching theories in practice, piloting and experiencing content along the curriculum and syllabus outline, training on educational materials to reinforce content and applied didactical understanding.

Figure 6: Module 4 key information [9]

Module 5

Title of the course	Doctorate Seminar
Course status	1. Faculty of Psychology and Educational Sciences
	2. PhD Program Vocational Education
	3. Mandatory
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 15 h. Students' independent working hours: 110 h.
Prerequisites	None
Objectives of the training course	Purpose of the course is to enhance existing knowledge, work on current topics and possible ways to solve problems related to it, do research and present it independently using research methods. Furthermore, discussing research results and entering into polemics, opinions mastering shared techniques as well as mastering the skills of working on a doctoral thesis are applied within the course. The doctoral student's seminar paper is not a constituent part of the dissertation.

Figure 7: Module 5 key information [9]

In addition to the mandatory modules 1–5, students can choose from various elective courses to sharpen their research or study profiles. Regarding the amount of Credit Points, they have to decide on at least two modules.

Module 6

Title of the teaching course	Human Resource Development and Personnel Development
Status of the Course	1. Faculty of Psychology and Education
	2. PhD Program Vocational Education
	3. Optional
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 95 h.
Prerequisites	None
Goals of the teaching course	The course examines central issues pertinent to the theory and practice of Human Resource Development (HRD). The major objective of the course is to provide participants with a comprehensive view of the field of HRD, which will enable them to understand, critically reflect and apply HRD theory in the working environment. The course reviews HRD policy and practice in the areas of training and development, knowledge management and organizational learning, career development, competency management, diversity and inclusion, and strategic HRD.

Figure 8: Module 6 key information [9]

The qualitative data clearly indicates the high importance placed on recruiting qualified personnel, ergo well-trained teachers, for achieving the reform goals of the Georgian government. However, the low prestige and poor payment for the teaching profession in the TVET sector do not attract applicants to open positions ("Due to the fact that we have less amount of salaries [...] we are losing not only the education possibilities but the persons who have proper brains and proper potential" (Expert 12)). The structure of state and private TVET institutions in Georgia further intensifies the competition for suitable applicants.

The PhD program addresses this shortage with the module *Human Resource Development and Personnel Development*, highlighting the necessity for TVET institutions to address both the personal and professional needs of their teachers. Module 6 therefore examines various aspects of the HR sector (including coaching, mentoring, and knowledge management, as well as health management and career development) and introduces analytical methods for evaluating personnel structures in the TVET sector [9].

Module 7

Title of the teaching course	Vocational Education for Sustainable Development
Status of the Course	1. Faculty of Psychology and Education
	2. PhD Program Vocational Education
	3. Optional
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 95 h.
Prerequisites	None
Goals of the teaching course	The aim of this course is to equip students with the necessary knowledge for evaluating approaches on vocational education for sustainability as well as skills for developing a conception for its implementation in a vocational education institution.

Figure 9: Module 7 key information [9]

Against the backdrop of the sparse presence of the sustainability topic in the expert interviews, Module 7 is of particular importance and essential value for the study program (cf. section *Data analysis – Sustainability*).

The adoption of the 17 Sustainable Development Goals (SDGs) in 2015 marks a milestone in international cooperation, with quality education being a central pillar of the goals catalog [10]. Vocational education, in particular, can be associated with almost all SDGs. In its *Sustainable Development Strategy* of 2006, the European Union (EU) already refers to the essential relevance of sustainable action structures and recognises the central role of education and vocational training in raising awareness and promoting behavioral changes among students in both professional and private contexts [11].

Although sustainability affects numerous aspects of work and training life, the course *Vocational Education for Sustainable Development* focuses, besides general definitions and sustainability concepts, on designing sustainable curricular and institutional structures. During the development process of TVET curricula in the area of sustainability, teaching methods and the qualification of teachers play again a crucial role and, thereby, form essential links to other modules [9].

The significance of digital teaching and learning is ubiquitous. The Covid-19 pandemic has further emphasized the need for media developments and sophisticated teaching-learning concepts (tools) in the field of TVET [12].

In Module 8 *Teaching and Learning in Natural and Virtual Learning Environments*, students are introduced to the independent creation of digital learning environments for various training areas, starting from content planning through practical design to testing phase [9].

Module 8

Title of the teaching course	Teaching and Learning in Natural and Virtual Learning Environments
Status of the Course	1. Faculty of Psychology and Education
	2. PhD Program Vocational Education
	3. Optional
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 95 h.
Prerequisites	None
Objectives of the teaching course	1. present relevant cognitive scientific theoretic fields and focus them based on the current state of research 2. overview of theories and models for designing learning processes in technical working and learning environments 3. Analysis of selected research questions regarding aspects of learning (e. g. perception, interaction, social action) in natural and virtual environments 4. design of learning environments and learning situations in technical working and learning environments 5. ability to present and reflect the research process and result 6. Interactive learning environments as part of today's processes in-the-job and off-the-job 7. Conception and implementation of a virtual learning environment • Teaching an technical or didactic principle • Reflection on target group, content and structure • Include assessments

Figure 10: Module 8 key information [9]

Early on, during the VoCasian project meetings, the Georgian partners confirmed that frontal teaching is the predominant teaching concept at Georgian universities and TVET institutions, highlighting a significant need for development in this area. "I can't remember any training module which I have attended [... any] kind of didactical training" (Expert 3) underscores a TVET teacher's acknowledgment of the inadequate didactical state of teaching. Additionally, the VET Strategy for Georgia articulates the improvement of methodological-didactical teacher training as a reform goal [3]. In this regard, Module 9 bridges the gap between recognized fundamental learning theories (from a scientific perspective) and the implementation of teaching-learning concepts based on these theories. As the overview (fig. 11) indicates, the development of competencies among course participants is prioritized, both personally and subject-specific.

Module 9

Title of the teaching course	VET Teaching and Learning Methods
Status of the Course	1. Faculty of Psychology and Education
	2. PhD Program Vocational Education
	3. Optional
	4. English Language Instructed
ECTS	Credits (ECTS): 5 (125 hours) Contact hours throughout semester: 30 h. (Seminars) Students' independent working hours: 95 h.
Prerequisites	No
Goals of the teaching course	**Subject-specific competence:** Knowledge of general didactic models, subject-specific didactic approaches and their relationship to each other as well as their genesis, possible applications and empirical verifiability. Knowledge of the historical development of subject didactics and the scientific-systematic classification of various models, approaches and theories of general and subject didactics. Ability to independently classify and scientifically-critically evaluate general and subject didactics approaches. **Personal competence:** Ability and willingness to analyze general and subject didactic approaches, concepts and models in a team, select them in a way that is appropriate to the objectives and content, and to orient the joint planning of teaching activities to the learning field concept of vocational education (social competence); ability and willingness to independently and responsibly select and use subject didactic approaches in the planning of teaching-learning, qualification and educational processes (independence).

Figure 11: Module 9 key information [9]

4 Conclusion

The Georgian TVET system is undergoing significant transformation and is increasingly receiving attention from political side, economy, and associations. As the qualitative results in this article demonstrate, vocational education is seen as playing a crucial role in addressing future economic challenges. Comprehensive reform efforts and strategy papers therefore aim to align the TVET system with national and international standards and to implement a strong practical focus, including the creation of dual structures, to meet the demands of the labor market [3, 8].

While the theory is exemplary, the implementation lags far behind. The ambitious goals shaping the political landscape must first establish themselves and demonstrate their effectiveness. In this context, experts are urgently needed who possess extensive professional and methodological-didactic expertise in the context of vocational education (both nationally and internationally) and who can underpin the diverse developments with scientific foundations.

The *PhD Vocational Education* makes an important contribution to this by emphasizing the imparting of sound empirical methodological competence as well as engagement with specific teaching-learning methods and TVET megatrends. To ensure the quality of the resulting research approaches of students, the process of writing the PhD thesis is continuously accompanied and evaluated by Georgian and German professors. The program was successfully accredited at TSU in December 2022 and received great recognition from the accreditation commission. The first cohort began their studies in March 2023, and the first graduates are expected to complete the program in early 2025.

References

[1] Schmid, K., Winkler, B., & Gruber, B. (2016). *Skills for the Future. Zukünftiger Qualifizierungsbedarf aufgrund erwarteter Megatrends*. Vienna: Institut für Bildungsforschung der Wirtschaft.

[2] Helmrich, R., Hummel, M., & Wolter, M. (2020). *Aktualisierte Megatrends. Relevanz und Umsetzbarkeit in den BIBB-IAB-Qualifikations- und Berufsprojektionen*. Bonn: Bundesinstitut für Berufsbildung.

[3] MoES (2013). *Vocational Education and Training Development Strategy for 2013–2020*. Tbilisi: MoES.

[4] Bader, R. (2004). Handlungsorientierung als didaktisch-methodisches Konzept der Berufsbildung. In R. Bader & M. Müller (Eds.), *Unterrichtsgestaltung nach dem Lernfeldkonzept* (pp. 61–68). Bertelsmann.

[5] KMK (2007). *Handreichungen für die Erarbeitung von Rahmenlehrplänen der Kultusministerkonferenz für den berufsbezogenen Unterricht in der Berufsschule und ihre Abstimmung mit Ausbildungsordnungen des Bundes für anerkannte Ausbildungsberufe*. Online: https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2007/2007_09_01HandreichRlplBerufsschule.pdf (Accessed: 06.04.2023).

[6] Stockmann, R. (2019). Ziele, Wirkungen und Erfolgsfaktoren der deutschen Berufsbildungszusammenarbeit. In M. Gessler, M. Fuchs, & M. Pilz (Eds.), *Konzepte und Wirkungen des Transfers Dualer Berufsbildung* (pp. 121–162). Springer.

[7] Mayring, P. (2015). *Qualitative Inhaltsanalyse* (12th ed.) Beltz.

[8] MoES (2022). *2022–2030 Unified National Strategy of Education and Science of Georgia*. Tbilisi: MoES.

[9] TSU (2022). *PhD Programme Vocational Education 2022*. Online: https://www.tsu.ge/en/programs/528 (Accessed: 21.06.2024).

[10] United Nations (2015). *Transforming our World: The 2030 Agenda for Sustainable Development*. New York: United Nations.

[11] Council oft he European Union (2006). *Renewed EU Sustainable Development Strategy*. Brussels: European Council.

[12] United Nations Development Programme (2024). *Digitalisation*. Online: https://www.undp.org/sgtechcentre/digitalisation (Accessed: 21.06.2024).

Methodological Training for Scientific Qualifications in TVET Research: A Reflection on the Pilot Teaching Program of the VoCasian Project

M. Boehner

This article reflects on the experiences and outcomes of teaching the research methods module in the PhD program for Technical and Vocational Education and Training (TVET) at Tbilisi State University (TSU), Georgia, introduced under the VoCasian project managed by the University of Magdeburg. The VoCasian project aims to strengthen the TVET sector in the Caucasus region by developing local research capacity. This reflection discusses the challenges and successes encountered, including students' eagerness but lack of prior research method training, the need for enhanced statistical training, and the effectiveness of small-scale exercises and simulations. The conclusions emphasize the critical role of this unique PhD program in fostering data-driven TVET policies and the ongoing need for support and supervision to build high-quality TVET research in the region.

1 Background information

The advancement of Technical and Vocational Education and Training (TVET) in Georgia and the broader Caucasus region is pivotal for developing a skilled labor force [1], aligning with the demands of the private sector and fostering economic growth [2]. The VoCasian project, a bilateral initiative between Germany and Georgia, addresses a critical gap in the local TVET research capacity by introducing a PhD program at Tbilisi State University (TSU). This paper provides a detailed account of the experiences and insights gained from teaching the research methods module in this program as well as the status quo of TVET research in Georgia which may serve as a point for departure for future research endeavors of the new graduate school.

2 Context of Teaching Scientific Skills in the TVET Realm

The TVET system in Georgia and the entire Caucasus region is "on the march," and has been identified as a major stepping stone toward a skilled labor force that meets the demands of the private sector and fosters economic growth [3–4]. National policies and international donors support the TVET sector through various development projects, one of which is the VoCasian project [5]. The VoCasian project aims to address the gap

in local TVET research capacity by developing a PhD program at Tbilisi State University (TSU), enhancing the ability of local researchers to provide evidence for further development without relying on external experts.

VoCasian, a component of long-established bilateral development aid between Germany and Georgia, aligns with other projects pursued in the field by partners such as the German International Cooperation (GIZ) and the German development agency (KfW) [5]. Notably, the TSU Master program, conducted in English and open to students from the entire Caucasus region, complements the PhD program by providing a seamless educational pathway for TVET professionals.

3 Experiences of the Teaching Mode in the TVET Research Module

The experiences of teaching the research methods module in the PhD program for Technical and Vocational Education and Training (TVET) at Tbilisi State University (TSU) revealed various insights into the effectiveness of different teaching modes. This chapter explores the benefits and challenges of synchronous and asynchronous teaching methods, emphasizing the importance of face-to-face interactions and online support.

3.1 Synchronous Face-to-Face Video Teaching

Synchronous face-to-face video teaching has proven to be highly effective in engaging students and fostering a productive learning environment. The following aspects highlight the strengths of this teaching mode:

- Interactive Learning: Incorporating small-scale exercises such as mini-cases encourages students to engage in deep, critical thinking. These exercises can include statistical thinking, rigorous reasoning, and identifying logical errors in scientific arguments. These activities not only stimulate intellectual engagement but also enhance the students' analytical skills.
- Immediate Feedback: The real-time interaction allows instructors to provide immediate feedback, address students' questions, and clarify complex concepts on the spot. This immediate exchange is crucial for maintaining high levels of engagement and ensuring that students grasp the material effectively.

3.2 Asynchronous Teaching

While asynchronous teaching offers flexibility, it has been observed to be less effective in this context. The following points highlight the challenges associated with asynchronous teaching:

- Incomplete Tasks: Many students did not fully complete LMS-based tasks or did not meet the expected standards. The lack of real-time interaction and immediate feedback might contribute to lower engagement and commitment to asynchronous assignments.

- Reduced Engagement: Without the structure of scheduled classes and the presence of an instructor, students may find it challenging to stay motivated and disciplined, leading to suboptimal learning outcomes.

3.3 Importance of Face-to-Face Sessions

Face-to-face sessions, whether in-person or virtual, are indispensable for establishing a strong personal relationship between the lecturer and PhD students. These sessions offer several benefits:

- Building Rapport: Direct interactions help in building trust and rapport, which are essential for creating a supportive learning environment. This personal connection can significantly enhance students' comfort levels and willingness to participate actively in discussions.
- Enhanced Communication: Face-to-face sessions allow for more nuanced communication, including non-verbal cues, which can aid in better understanding and empathy between the lecturer and students.

3.4 Online Support via Video Counseling

Supplementing teaching with online or direct support through video counseling sessions can be highly beneficial. This approach offers the following advantages:

- Task Completion: Regular check-ins and video counseling can help ensure that students are on track with their assignments and provide them with the necessary guidance to complete tasks effectively.
- Individualized Support: These sessions allow for personalized attention, addressing specific student needs and challenges, thereby enhancing their overall learning experience.

The experiences with regard to the teaching mode highlight the importance of synchronous face-to-face interactions, the limitations of asynchronous teaching, and the critical role of personal relationships and ongoing online support in effective teaching. Integrating these insights can significantly improve the design and delivery of the research module. However, there are also valuable experiences that extend beyond the mode of teaching and may be even more relevant.

4 Further Teaching Experiences and Student Engagement

4.1 Eagerness and Time Constraints

The students in the VoCasian PhD program demonstrated high levels of enthusiasm and eagerness to learn. However, they often faced significant time constraints, balancing their studies with professional responsibilities. This dual commitment highlighted the need for flexible scheduling and adaptive teaching methods to accommodate their busy schedules. Despite these challenges, their eagerness to engage with the material and their sharp intellect were evident throughout the module.

4.2 Lack of Prior Research Method Training

A significant challenge encountered was the students' lack of prior training in research methods. Many students had completed their master's degrees without substantial exposure to research methodologies, necessitating a foundational approach in the PhD program. This gap underscored the importance of integrating comprehensive research training early in the program to build the necessary skills for high-quality TVET research.

4.3 Need for Enhanced Statistical Training

Statistical training emerged as a critical area in need of enhancement. The usage of quantitative methods was not widespread among the students, and there was a clear need for additional time and resources to build their competencies in this area. This finding aligns with broader observations about the need for improved statistical education in TVET research [6].

5 Effective Teaching Strategies

5.1 Integration of Small-Scale Exercises

Small-scale exercises proved to be highly effective in engaging students and fostering critical thinking. Activities such as breakout group discussions and practical exercises in research design and data analysis were well-received and facilitated active learning. These exercises were particularly beneficial during synchronous online sessions, helping to maintain engagement and interaction.

5.2 Simulation of Research Projects

The module included a simulation of real research projects, which was instrumental in providing hands-on experience with various research methods. Each student was tasked with developing and presenting a mini research project, simulating the entire research process from hypothesis formulation to data analysis and reporting. This practical approach was fruitful in reinforcing theoretical knowledge and developing practical skills.

6 Challenges in Scientific Writing and Use of AI

6.1 Scientific Writing Support

While the students had excellent English language skills, they required substantial support in scientific writing. Detailed counseling and feedback were necessary to improve their ability to write clearly and coherently. Scientific writing is a crucial skill for researchers, and ongoing support in this area is essential to ensure that students can effectively communicate their research findings.

6.2 Use of Artificial Intelligence

The use of artificial intelligence (AI) in research was largely unreflected among the students, posing risks of unsuitable contributions that did not meet academic standards with respect to references and using AI's "hallucinations" without further inspection. Training on the appropriate use of AI and proper referencing was essential to ensure academic integrity. Ensuring that students understand the limitations and appropriate applications of AI tools is crucial for maintaining the quality and reliability of their research.

7 Addressing Intercultural Misunderstandings

Georgia is a proud nation with a rich cultural heritage and people who take great pride in their accomplishments and identity. Understanding and navigating these cultural nuances is crucial for effective teaching and communication, especially in a PhD program. This chapter highlights the importance of culturally sensitive feedback and approaches to addressing potential misunderstandings.

7.1 Importance of Positive Framing in Feedback

Feedback is an integral part of the learning process, and in the Georgian context, it is expected and valued. However, it is essential to deliver feedback in a manner that respects the pride and dignity of the students. Positive framing of feedback can significantly impact how it is received and acted upon. Here are some key considerations:

- Positive Reinforcement: Begin feedback by acknowledging the students' efforts and strengths. This positive reinforcement helps build confidence and sets a constructive tone for addressing areas of improvement.
- Constructive Criticism: When pointing out mistakes or areas requiring improvement, it is vital to frame them as opportunities for growth and development. Emphasize that making mistakes is a natural part of the learning process and that they provide valuable learning experiences.

7.2 Expressing Understanding and Support

Expressing empathy and understanding towards students' challenges fosters a supportive learning environment. It is beneficial to communicate that everyone, including the lecturer, has faced similar difficulties and has grown from those experiences. This approach helps in building rapport and trust with the students. Key strategies include:

- Personal Experiences: Share personal anecdotes where appropriate, illustrating that the lecturer has also encountered and overcome similar challenges. This can make the feedback more relatable and less intimidating.
- Encouragement and Support: Clearly express willingness to support students in their journey. Outline the steps they can take to improve and offer to provide additional guidance and resources as needed.

7.3 Addressing Problems with a Forward-Looking Approach

When addressing problems or issues, it is crucial to combine them with actionable solutions and a positive outlook. This approach helps maintain the students' motivation and focus on their progress. Effective strategies include:

- Solution-Oriented Feedback: Focus on practical solutions and steps students can take to address the identified problems. Provide specific recommendations and resources that can help them improve.
- Collaborative Problem-Solving: Encourage a collaborative approach where students feel involved in the problem-solving process. This can include setting goals together and planning follow-up actions.

7.4 Cultural Sensitivity and Communication

Intercultural misunderstandings, particularly regarding time management and professional commitments, were common. Addressing these issues required empathy and open communication, especially as Western European and Georgian ways seemed to overlap considerably, on the superficial first level. Therefore, establishing a clear course and grading expectations early on and providing flexible timelines helped mitigate these challenges. Understanding and respecting cultural differences that are not obvious on first glance between Western Europe and the Caucasian region are vital for creating a supportive and effective learning environment.

Understanding and respecting cultural nuances in feedback and communication is essential for effective teaching in the Georgian context. By framing feedback positively, expressing empathy and support, and addressing problems with a forward-looking approach, lecturers can foster a supportive and productive learning environment for PhD students.

8 Status Quo of Research on the TVET Sector

8.1 Existing TVET research in Georgia

Research on TVET in Georgia has traditionally been limited but is now expanding, thanks in part to projects like VoCasian. The Torino Process monitoring report for Georgia highlights that the country's TVET system is progressively aligning with international benchmarks in terms of accessibility, quality, and relevance [5]. However, challenges remain in ensuring comprehensive research coverage across all aspects of TVET, but the Skills has singled out fields of interest and commissioned several studies that are repetitive and brought about several key findings. The Skills Agency of Georgia's 2023 report provides a detailed analysis of the TVET sector, focusing on several key areas [4,6]:

- Access and Participation:
  Initial VET Accessibility: Initial VET in Georgia is noted for its high accessibility and attractiveness, with state policies ensuring broad enrolment opportunities [5]. This is supported by the Georgian Law on Vocational Education, which allows citizens to enroll in IVET programs post-basic education without age restrictions.

- Quality and Relevance:
  Alignment with Labor Market Needs: There is a strong link between VET programs and labor market demands, with dual and cooperative learning models emphasizing practical, work-based learning experiences [5].
  Employability Challenges: Despite the alignment with labor market needs, employability rates for VET graduates remain below international averages. This suggests a gap between the skills provided by the TVET system and those required by employers [5].
- Innovation and Excellence:
  Digital and Green Skills: The integration of digital skills in VET programs is above average, reflecting a strong response to the digital transition. However, the incorporation of green skills is still developing, indicating room for improvement in this critical area [5].
- Employment Market Insights:
  The World Bank provides a comprehensive overview of Georgia's employment market, highlighting both opportunities and challenges for TVET graduates:
  Economic Growth and Labor Market Dynamics: Georgia has experienced robust economic growth, which has positively impacted the labor market. However, structural issues, such as the mismatch between skills and job requirements, persist [2].
  Youth Employment: Youth unemployment remains a significant challenge, underscoring the need for TVET programs to better equip young people with relevant skills for the modern job market [2].

8.2 International Perspectives on TVET Research

International organizations such as the ILO and the EU have emphasized the importance of developing robust TVET systems to support economic growth and social inclusion:

ILO's Skills for Employment Policy: The ILO's policy brief on Georgia underscores the need for continuous improvement in TVET to support lifelong learning and employability [1].

EU's Support for TVET: The EU has been actively supporting TVET reforms in Georgia, focusing on aligning educational outcomes with labor market needs and enhancing the quality of vocational training [3].

8.3 Potentials for Future Research

Based on the current status of TVET research in Georgia, several recommendations can be made for research gaps to be filled by the graduate school at Tbilsisi State University:

- Expand Research Scope: Future research should cover a broader range of topics within the TVET sector, including the effectiveness of new teaching methodologies, the impact of digital and green skills training, and the long-term outcomes for graduates.

- Strengthen Data Collection: Improving data collection methods will enhance the reliability and comparability of research findings, providing a stronger basis for policy-making and program development.
- Promote International Collaboration: Encouraging collaboration with international research institutions can help bring new perspectives and best practices to the Georgian TVET sector.

9 Recommendations and Future Directions

9.1 Enhanced Support and Supervision

Continuous support and supervision are necessary to ensure high-quality research outcomes that can fill the gaps and the need for data. The experiences from this module highlight the importance of foundational research training, enhanced statistical education, and practical exercises in developing competent researchers. As the program evolves, addressing capacity constraints and providing ongoing support will be crucial to sustaining its success.

9.2 Building Research Capacity

The VoCasian project has laid a solid foundation for TVET research in Georgia. Continued effort and collaboration are essential to build on this foundation and develop a robust research capacity that can drive data-driven TVET policies and practices. Building upon the existing cooperation between Magdeburg University in Germany, lecturers from other institutions (like the author's Mainz University) and encouraging in-depth collaboration with international experts and institutions can further enhance the research capabilities of the program. Moreover, cooperation with bordering countries such as Armenia and Azerbaijan in the Caucasus region or even Pakistan, where a first fathoming of common interests has been initiated lately, should be intensified and tap new TVET research areas entirely as well as fostering regional integration.

10 Conclusions

The PhD program in TVET at TSU represents a significant step forward in developing local research capacity in Georgia and the Caucasus region. The students' enthusiasm and sharp intellect are promising indicators of the program's potential to drive data-driven TVET policies and practices. However, continuous support and supervision are necessary to ensure high-quality research outcomes that in turn may drive quality development in the TVET sector [7–8.

The experiences from this module highlight the importance of foundational research training, enhanced statistical education, and practical exercises in developing competent researchers. As the program evolves, addressing capacity constraints and providing ongoing support will be crucial to sustaining its success.

The VoCasian project has laid a solid foundation for TVET research in Georgia, and with continued effort and collaboration, it can significantly contribute to the development of an enlightened and effective TVET system in the region, as the TVET sector in Georgia is at a critical juncture, with significant progress being made through initiatives like the VoCasian project. However, continuous efforts are needed to address existing gaps and enhance the overall effectiveness of TVET programs. By expanding research and leveraging international support, Georgia can build a robust data-driven system.

References

[1] International Labour Organization (ILO). (2019). Skills for Employment Policy Brief: Georgia. Geneva: ILO.
[2] World Bank. (2023). Enhancing Education Development in the Caucasus. Washington D. C.: World Bank.
[3] Cedefop (2023). The future of vocational education and training in Europe: synthesis report. Luxembourg: Publications Office. Cedefop reference series; No 125. http://data.europa.eu/doi/10.2801/08824
[4] Skills Agency of Georgia. (2023a). VET Development in Georgia: Key Indicators. Tbilisi: Skills Agency.
[5] European Training Foundation (ETF). (2023). Torino Process System Monitoring Report: Georgia. Torino: ETF.
[6] Skills Agency of Georgia. (2023b). Research of Skills Agency. Presentation provided to Tbilisi State University. Tbilisi: Skills Agency.
[7] Boehner, M. (2021). Development and Quality Improvement in TVET in Three Countries on Three Different Continents: Georgia, Sri Lanka and Rwanda. Academia Papers.
[8] Hodes, Paul (2023). Eine vergleichende Untersuchung von Expertenmeinungen zur Wirk-samkeit von Qualitätsansätzen im berufsbildenden System drei Länder, Georgien, Ruanda und Sri Lanka, unter besonderer Berücksichtigung des QiF-(Quality-is-Fun)-Konzepts. Master thesis at the University of Mainz.

Combining Georgian and German Expertise to Improve Vocational Education in Georgia

R. Happ, S. Heidel, L. F. Manrique Molina

In the summer semester of 2022, the VoCasian project initiated a PhD program in Technical Vocational Education and Training [TVET] in Tbilisi. A curriculum was designed with the assistance of doctoral candidates' assistance who were then in full-time employment. To this end, the students participated in Module 3 "Research Methods and Methodology in Vocational Education and Training II" and Module 9 "Teaching and Learning Methods in Vocational Education and Training". Following Pellegrino´s Curriculum-Instruction-Assessment Triad, Module 3 addressed various research methods, while Module 9 focused on didactic models and the development of professional and personal teaching skills. The alignment of the curriculum provided a coherent educational framework. The effectiveness of the teaching methods was demonstrated by the successful accreditation of the curriculum.

1 Introduction

Vocational Education is one of the major factors contributing to a higher level of youth employment rate in Germany [1]. In April 2024, Germany's youth unemployment rate stood at 5.7%, which is notably lower than the European Union's average of 14% [2]. Regarding the question of building bridges for young people from school to the labor market and to work, TVET is a facilitator in at least two ways. Firstly, TVET develops vocational action competence, which enables young adults to act competently in a working environment. Secondly, TVET fosters skilled employees, who contribute to the demands of the economy and consequently supports economic prosperity [1]. These two broadly outlined advantages of TVET form the framework for the VoCasian Project. The VoCasian Project aims to enhance the professionalization of vocational education in Georgia. One of the three pillars to foster this professionalization was the implementation of a PhD program for vocational education [3]. This PhD program, which comprises nine modules, contributes to the sustainable development of TVET educators.

Aside from other modules, the authors were responsible for the development, delivery, and assessment of two modules. These modules were Module 3: "Research Methods and Methodology in VET II" and Module 9: "Teaching and Learning Methods in VET". Research on the transferability of vocational education structures shows that the inclusion and consideration of country specific circumstances are essential for a successful development of the TVET modeled on the German TVET system [1, 4]. Therefore, beyond the theoretical foundation of curriculum development, it is crucial

to consider systematical, societal, economical, and individual requirements when developing and implementing modules [5–7]. Accordingly, the country-specific conditions of Georgia and their individual, social and economic circumstances must be taken in account to develop demand-oriented modules, which enable a long-lasting and successful education of vocational education educators.

Two important pillars for the empowerment of future vocational education teachers in Georgia were the modules Research Methods in Vocational Education and Teaching and Learning methods in vocational education. The task was to develop a curriculum and assessment methods, provide guidance and implement these two modules.

The Curriculum triangle of Pellegrino [7] served as the theoretical basis for developing the subject specific curricula. Consequently, the subject specific curriculum was oriented towards renowned and established theoretical concepts, such as the ideal typical research process according to Döring and Bortz [8] for the research methods module, and the structure model of teaching-and-learning processes in the vocational education from Nickolaus [9] for the teaching and learning methods module. Both concepts served as a curricular content orientation and advance organizers within the modules for the doctoral candidates. However, all the theoretical foundations had to be developed under consideration of the existing Georgian conditions. Thus, the development was a dialectical process of theoretical development, empirical feedback, and evaluation.

This contribution is structured into four chapters. The second chapter sketches the theoretical framework which build the basement for developing the modules. In the third chapter, the local conditions are examined, presenting the process of how these conditions were considered and conducting the modules. The fourth chapter summarizes the development and implementation process as a lesson learned experience and provides an outlook for further research and steps in enhancing vocational education situation in Georgia.

2 The Curriculum-Instruction-Assessment Triad as a framework for module development

Regarding Kelly [5] (for curriculum planning in general) and Cedefop [6] (for curriculum planning with particular focus on vocational education) curriculum planning is a dialectical process that involves balancing the requirements, needs, and circumstances of learners with the social context. This approach aims to empower learners to become responsible and capable actors in society, and, in the case of Cedefop, particularly within a vocational context. This guideline provides a precise framework and orientation for the development of the two modules. Considering the theoretical foundations of Kelly [5] and Cedefop [6], a problem arose during planning of the modules. Despite an investigation and exchange about the contextual situation in Georgia, it was not possible to discover everything important for the consideration of Georgian requirements

in the curriculum development. As a result, the development of the curriculum had to begin at the level that was known to the researchers. Moreover, the theoretical foundations {5-6] also point out that a curriculum must respond to the social context. This implies a continuous process of evaluation and adaptation of the curriculum. Especially for this project, this is a process that creates more awareness and meaning. Considering the circumstances that the development creates, the project was designed with a pre-post accreditation phase. The pre-phase was used to implement a curriculum that best fits the current and known conditions but also provides the opportunity to improve the curriculum after the evaluation processes.

Based on this crucial theoretical framework, it is necessary to delve deeper into the operational level of developing a curriculum. Therefore, Pellegrino [7] and his Curriculum-Instruction-Assessment Triad provide a guideline that combines three facets of didactical actions. In the following quote, Pellegrino [7] emphasizes the focus in curriculum development:

> "Alignment between curriculum, instruction, and assessment is critical to equitable education and requires a common knowledge base based on scientifically credible models of cognition and learning" [7] (see Figure 1).

Under consideration of curriculum triangle of Pellegrino [7] two modules were designed for the PhD program. Both modules were successfully accredited and implemented. Each module encompasses and overall workload of 155 hours for the students. Thirty hours are reserved for contact lessons and the rest is planned for self-study working time and intensive phases for literature study. Assessments of the module are differently organized; however, they have a midterm and a final examination in common. After passing the exam successfully, students receive 5 ETCS.

Teachers need to meet several requirements in order to design topic-oriented courses and lessons [10]. On the one hand, this includes a mix of methods that allow for active and interactive learning phases for the students, as well as teacher-oriented lessons. For teachers, access to literature is essential to provide comprehensive instruction. On the other hand, students need a high level of concentration and motivation in order to participate effectively in the courses, as well as sufficient time to prepare and follow up on the course material using the literature. The use of different teaching methods is an additional challenge for the students, which is particularly noticeable in Module 9, given the diversity of educational systems.

This ensures that students acquire the knowledge and skills they need for success in the program. The curriculum encompasses both knowledge and skills within the subject areas, sets learning goals and serves as a roadmap for achieving these goals.

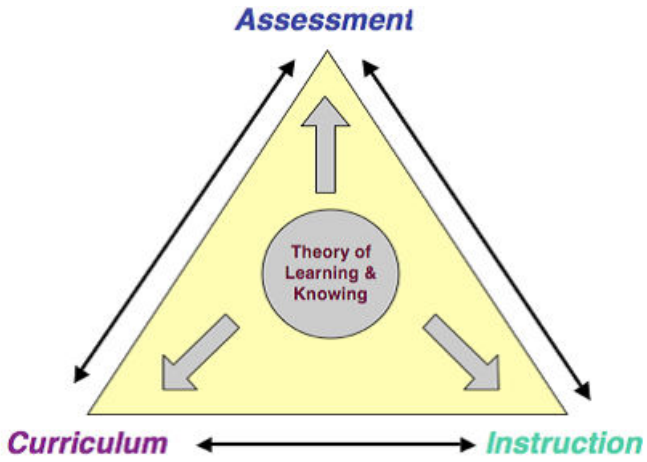


Figure 1: Alignment among curriculum, instruction, and assessment [7]

3 Module 3 "Research Methods and Methodology in Vocational Education II"

According to Pellegrino [7], the syllabus for Module 3 "Research Methods and Methodology in Vocational Education II" includes requirements for relevant knowledge and skills as well as the breadth of content in the subject areas. The aim of this course is to learn quantitative and qualitative research methods and to apply them to a current research example, enabling the students to perform their own research. Within the course, analysis software for quantitative SPSS (IBM) and for qualitative MAXQDA (VERBI) analysis were presented. To reach this aim, the syllabus was developed based on ideal typical research processes for quantitative (see Figure 2) and qualitative studies. Along this process, topics were provided that enable students to apply theory and carry out their own research in a reasonable way. To ensure the theoretical foundation following topics are part of the syllabus: an introduction to the main research paradigms (quantitative and qualitative methods), an overview about descriptive and inferential statistics combined with exemplary calculations on a real dataset, statistical analysis techniques were presented, which should enable to conduct mean comparisons depending on the number of variables and the type of data (e. g., t-test and ANOVA), pre- and post-test analysis, also known as repeated measures, which are included as a particular design with a specific value for educational studies, and correlation analysis introduced with a concrete delineation to regression, multiple linear regression, discriminant and cluster analysis, and finally factor and reliability analysis. Eight lessons were dedicated to quantitative methods. The syllabus includes seven topics related to qualitative research methods. Questionnaire development, analysis methods, and quality criteria are also covered. The goal is to deepen students' understanding of basic research methods (as an example, see Figure 2) and to introduce advanced

quantitative and qualitative techniques. Practical relevance is provided using real, current research datasets. Students use SPSS for quantitative analysis and MAXQDA for qualitative analysis. In Module 3, students are provided with and recommended a selection of standard works on statistical analysis in social and educational science methodology. These include Bryman [11]; Cohen, Manion and Morrison [12]; Denzin & Lincoln [13], Kuckartz & Rädiker [14]; Mayring [15]; Silverman [16].

Learning outcomes include mastering the research process, understanding different research methods, and recognizing how method selection relates to research questions. Building on this, doctoral candidates will develop research questions and then apply appropriate methods to their questions, use statistical software, and critically evaluate their application. The module also includes a mid-term examination and a final examination with an oral presentation on a given topic and a written paper. Assessment is based on a defined minimum competency for both the midterm and the final exam.

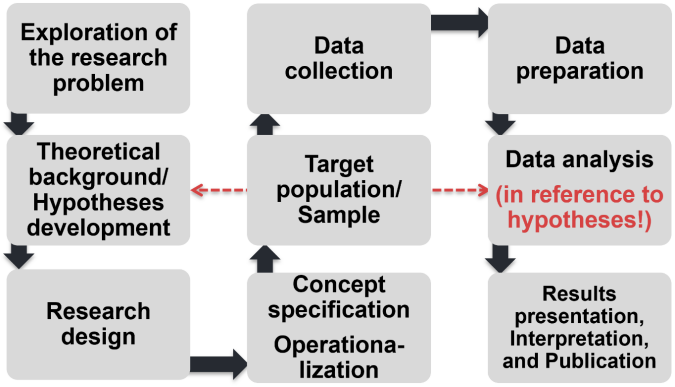


Figure 2: Typical research process as Curriculum Content Orientation and Advance Organizer

Note. Ideal typical research process (own illustration, translated from German, in reference to Döring and Bortz [8]

In line with Deci & Ryan's self-determination theory [17] and constructivist approaches to teaching and learning [10], care was taken when designing the course to ensure that Module 3 on research methods is taught close to the real world and that learner autonomy, the experience of competence and social integration are considered at the same time. Taking these criteria into account, the group of doctoral candidates writing a dissertation was given the opportunity to incorporate their specific dissertation proposal into the module. In the spirit of scaffolding [18], a framework was created for students to actively apply the topics covered to their own dissertation project. Feedback was given on the applicability and adaptation of the methods for their own research question, which was dealt with as part of the dissertation. This practical design, with a view to their own dissertation, proved to be motivating for the students on the course.

4 Module 9 "Teaching and Learning Methods in Vocational Education and Training"

The design of the curriculum for Module 9 "Teaching and Learning Methods in Vocational Education and Training" was also based on Pellegrino's [7] principles of curriculum development. Module 9 focuses on promoting the development of professional and personal skills. The learning objectives of the module are for doctoral candidates to gain a comprehensive understanding of general didactic models, subject-specific approaches, and their empirical validation. Doctoral candidates will learn to implement and evaluate methods independently, as well as to participate in team-based analyses and align them with teaching objectives. Additionally, doctoral candidates deepen their knowledge of business education approaches, basic concepts of general education, and the historical context of vocational and business education. The aim of the module is to acquire comprehensive knowledge of theories of adolescent and adult development, developmental assessment of learning environments, and the application of business didactics (see Figure 3). The structural model of teaching and learning processes in vocational education by Nickolaus [9] serves two primary purposes. Firstly, it provides a framework for planning the curriculum of this module. The model offers a comprehensive overview of the teaching and learning processes and the conditions that must be considered in curricular planning. To address the complexity of these processes, the model is divided into three levels: Conditions, Processes and Outcomes [9]. In this way, the model also serves a second function by representing the interconnectedness of educational processes and the social context of learners, teachers and educators. Each level considers the unique characteristics of the dual system with at least two learning locations – school and the workplace [9].

This module discusses vocational education and training disciplines, the German vocational education and training system, and considerations regarding international transferability. It also considers developmental psychological approaches, with a focus on Bronfenbrenner's [19] ecologically oriented approach, vocational pedagogical and didactic principles [20], various learning theories, and critically evaluates their applicability in vocational pedagogical teaching and learning methods [21].

Moreover, motivational strategies in general, with a stronger focus on the self-determination theory of Deci & Ryan [17] as a basis for motivational processes are addressed. Furthermore, the handling and consideration of heterogeneity (e. g., [22] Wenning and [23] Markic & Abels) in general and specifically with a focus on vocational education is part of the course. The role and function of assessment and evaluation standards, as well as the possibilities of feedback, are part of the curriculum. The topics of the use of digital media for didactic purposes and communication techniques, and their continuous reflection on appropriate use and the state of the art, round off the curriculum. In Module 9, doctoral candidates are also recommended to do basic work in preparation for the content of the course. Doctoral candidates were also recommended basic works that prepare the content of the module at an understandable textbook level. These include the works of Anderson, Krathwohl & Bloom [24]; Bloom [25];

Bronfenbrenner [19]; Deci & Ryan [17]; Emmer [26]; Hattie [27], Pilz [20]; Richardson [28], and Schunk [21].

The module was assessed through active participation in the course, interim assignments, an oral seminar presentation and a final assignment based on various aspects of the module. The assessment criteria are based on defined minimum competencies for both the interim and final assessments.

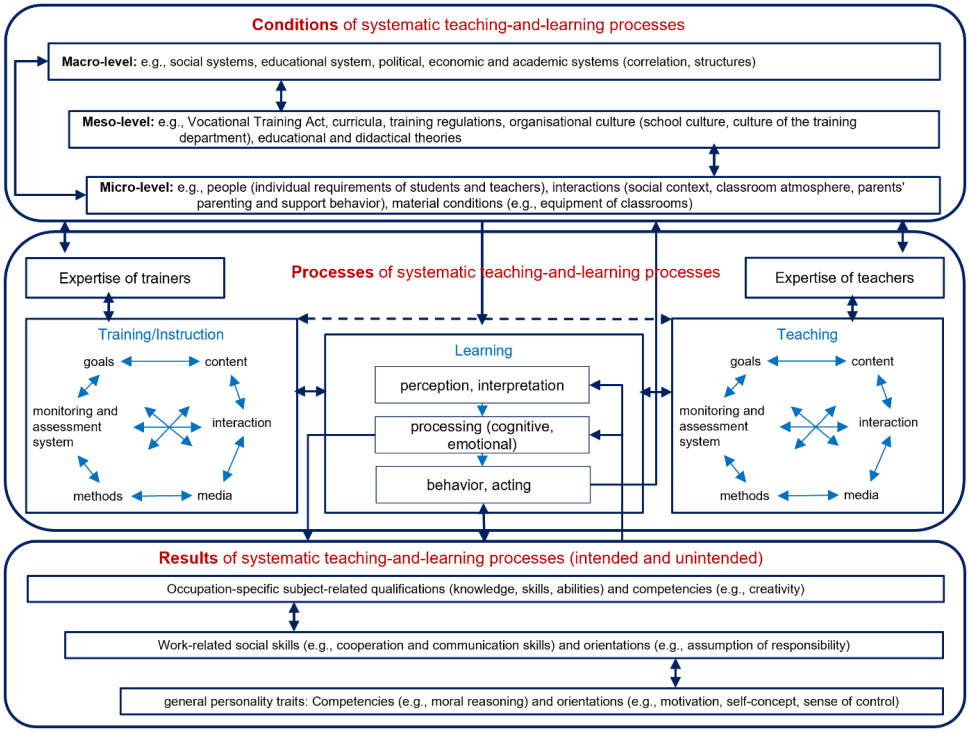


Figure 3: Structure model of teaching-and-learning processes in the vocational education as a Curricular Content Orientation and Advance Organizer

Note: Structure model (translated from German; own illustration in reference to Nickolaus [9])

5 Combining theoretical foundation and local conditions

Similar to school's modules, university modules must consider the current conditions of students and the systematical requirements regarding buildings, time of the lesson, access to literature, daily life obligations, and previous knowledge regarding vocational education, research, and academic techniques [10, 29]. Considering the aspects of heterogeneity as Wenning [22] suggested, doctoral candidates came from various prior fields of study such as law, physics, special education, and language studies. In addition, the majority of doctoral students are full-time working parents and differ greatly

in terms of their degree and the career path they have chosen after graduation. Given these circumstances, the lessons took place in the evening after a full day of work and caring for children or parents. Regardless of their daily life the doctoral candidates showed extraordinary motivation to follow and contribute to the lessons. The doctoral students working full-time alongside their studies had different backgrounds, previous knowledge, ages, degrees, and current professional activities. All doctoral candidates have previous knowledge from completed courses. Due to the challenges of daily life, attendance varied. This presented a challenge not only for the students but also for the teachers, therefore, both sides required a high degree of flexibility, motivation, and discipline to effectively manage the demands of the program.

In each semester in which a course was offered in 2022 and 2023, there was also an on-site block appointment with the students in Georgia. This was especially important when designing the schedules for the courses. This on-site appointment was not scheduled directly at the beginning of the course. It was important for us to get to know the group first and coordinate the course offerings. With this prior knowledge, it was possible to design the course program to be appropriate for the learners. The fact that the face-to-face appointments in Georgia took place during the course of the semester and not right at the beginning meant that the students were able to prepare smaller presentations that could be discussed in the group.

In 2022, the modules were offered by two German teachers and one Colombian teacher for testing and then revision. In 2023, the courses were offered as team teaching (a tandem of German and Georgian lecturers) to ensure the continuity of the course. This allowed the Georgian lecturer to gain an insight into the content and clarify any queries. For the project, team teaching is an important building block for the sustainable implementation of the modules.

6 Conclusions and Outlook

To sum up, the successful accreditation of the designed curricula represents a significant milestone. The positive evaluation of the course by the doctoral candidates supports the effectiveness of the desired achievement of learning objectives. Significant learning processes were observed not only among doctoral candidates, but also among teachers and administrators. This highlights the effectiveness of the chosen teaching methods and course content. The use of hybrid teaching can be enriching for both doctoral candidates and faculty as it promotes a dynamic learning environment and increases engagement. Maintaining the collaborative, international nature of the courses is critical for all involved. Moving forward, the focus will be on improving conditions for doctoral candidates to ensure that their educational experience continues to contribute to their growth and success. In addition, the courses can be offered at other universities in Georgia to bring the benefits of our innovative educational approach to more doctoral candidates and to contribute to the development of education in Georgia.

References

[1] Euler, D. (2013). The dual system in Germany – a model for transfer abroad? [Das duale System in Deutschland – Vorbild für einen Transfer ins Ausland?]. Bertelsmann Stiftung.

[2] EUROSTAT (2024, June 13). Unemployment rate (%) – monthly data. https://ec.europa.eu/eurostat/databrowser/view/ei_lmhr_m/default/table?lang=en&category=euroind.ei_lm

[3] VoCasian (2021, June 8). Project Overview Chart. https://www.mp-invet.de/files/2021/04/0001.jpg

[4] Strittmatter, J., & Böhner, M. M. (2019). Successfully shaping German vocational education and training in partner countries: A practice-oriented approach for bilateral transfer processes [Deutsche Berufsbildung in Partnerländern erfolgreich gestalten: Ein praxisorientierter Ansatz für bilaterale Transferprozesse]. In M. Gessler, M. Fuchs & M. Pilz (Eds.), *Concepts and effects of the transfer of dual vocational training, international vocational training research [Konzepte und Wirkungen des Transfers Dualer Berufsausbildung, Internationale Berufsbildungsforschung]* (pp. 515–548). Springer VS. https://doi.org/10.1007/978-3-658-23185-9_14

[5] Kelly, A. V. (2009). *The curriculum: Theory and practice* (6th ed.). SAGE Publications.

[6] Cedefop (2022). The future of vocational education and training in Europe. Volume 1: the changing content and profile of VET: epistemological challenges and opportunities. Luxembourg: Publications Office of the European Union. Cedefop research paper; No 83. http://data.europa.eu/doi/10.2801/215705

[7] Pellegrino, J. W. (2010). *The design of an assessment system for the Race to the Top: A learning sciences perspective on issues of growth and measurement.* Educational Testing Service.

[8] Döring, N., & Bortz, J. (2016). *Research methods and evaluation in the social and human sciences* (5th. completely revised, current and expanded edition). [*Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften* (5. vollständig überarbeitete, akt. und erweiterte Auflage)*].* Springer.

[9] Nickolaus, N. (2019). *Didactics – models and concepts of vocational training. Orientation services for practice* (5th totally revised ed). *[Didaktik – Modelle und Konzepte beruflicher Bildung. Orientierungsleistungen für die Praxis* (5. komplett überarbeitete Auflage)]. Schneider Verlag.

[10] Dubs, R. (2009). *Teacher behavior: A contribution to the interaction of teachers and learners in the classroom* (2nd, revised edition) [*Lehrerverhalten: Ein Beitrag zur Interaktion von Lehrenden und Lernenden im Unterricht* (2., überarbeitete Auflage)]. Franz Steiner Verlag.

[11] Bryman, A. (2016). *Social research methods*. Oxford university press.

[12] Cohen, L., Manion, L. & Morrison, K. (2017). *Research Methods in Education*. Routledge.

[13] Denzin, N. K., & Lincoln, Y. S. (2003). (Eds.), *The Landscape of Qualitative Research. Theories and Issues* (2nd ed.) SAGE Publications.

[14] Kuckartz, U., & Rädiker, S. (2019). *Analyzing qualitative data with MAXQDA*. Springer International Publishing.
[15] Mayring, P. (2004). Qualitative content analysis. *A companion to qualitative research, 1*(2), 159–176.
[16] Silverman, D. (2022). *Doing Qualitative Research* (6th ed.) SAGE Publications.
[17] Deci, E., & Ryan, R. (2002). *Handbook of Self-Determination Research*. University of Rochester Press.
[18] Hogan, K., & Pressley, M. (Eds.) (1997), *Scaffolding Student Learning. Instructional Approaches and Issues*. Brookline Books.
[19] Bronfenbrenner, U. (1979). *The Ecology of Human Development. Experiments by Nature and Design*. Harvard University Press.
[20] Pilz, M. (2012). *The Future of Vocational Education and Training in a Changing World*. Springer VS.
[21] Schunk, D. H. (2012). *Learning theories: An educational perspective* (6. ed., internat. ed.) Pearson.
[22] Wenning, N. (2007). Heterogeneity as a dilemma for educational institutions [Heterogenität als Dilemma für Bildungseinrichtungen]. In S. Boller, E. Rosowski & T. Stroot (Eds.), *Pedagogy. Heterogeneity in schools and lessons. Approaches to dealing with diversity in education [Pädagogik. Heterogenität in Schule und Unterricht. Handlungsansätze zum pädagogischen Umgang mit Vielfalt]* pp. 21–31). Beltz.
[23] Markic, S., & Abels, S. (2014). Heterogeneity and Diversity: A Growing Challenge or Enrichment for Science Education in German Schools? *Eurasia Journal of Mathematics, Science and Technology Education, 10*(4), 271–283. https://doi.org/10.12973/eurasia.2014.1082a
[24] Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.
[25] Bloom, B. S. (1969). *Taxonomy of educational objectives: The classification of educational goals: Handbook I, Cognitive domain*. McKay.
[26] Emmer, E T. (2013). *Classroom management for middle and high school teachers*. Pearson.
[27] Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
[28] Richardson, V. (2002). *Handbook of research on teaching* (4th ed.) American Educational Research Association.
[29] Helmke, A. (2022). *Teaching quality and professionalization. Diagnostics of teaching-learning processes and evidence-based lesson development [Unterrichtsqualität und Professionalisierung. Diagnostik von Lehr-Lern-Prozessen und evidenzbasierte Unterrichtsentwicklung]*. Klett Kallmeyer.

Sustainable Institutionalization of project results via the format Graduate School

H. Tegelbeckers, T. Volkmann

In collaboration with the Otto-von-Guericke University and supported by the Federal Ministry of Education and Research, a TVET-specific PhD program was developed at Ivane Javakhishvili Tbilisi State University. The VoCasian project, aligned with Georgia's national vocational education reform agenda, aims to establish a sustainable Graduate School to foster research and develop academic teaching personnel. The initiative seeks to address challenges in vocational education, integrating the program into Georgia's education system and enhancing stakeholder collaboration. Despite obstacles such as the COVID-19 pandemic and political instability, significant progress was achieved, including successful grant applications and program accreditation. The Graduate School aims to promote professional development, international networking, and structured research environments, contributing to educational reform and workforce readiness in Georgia. By fostering collaboration among academia, industry, and educational institutions, the initiative highlights the critical role of graduate schools in advancing vocational education research and practice. This model serves as a blueprint for similar initiatives in other developing countries, demonstrating the importance of graduate schools in fostering scientific research and professional growth in the TVET sector.

1 Introduction

The global landscape of Technical and Vocational Education and Training (TVET) has evolved significantly, highlighting the need for advanced research and professional development to enable institutional growth in the sector especially for developing and newly industrialized countries. Georgia, recognizing the critical role of vocational education in economic development and workforce readiness, has undertaken substantial reforms to enhance its vocational education system. Based on those reforms the Otto-von-Guericke University (OvGU) has partnered with the Ivane Javakhishvili Tbilisi State University (TSU) to address the growing demand for structured programs that support scientific research and the development of future academic and professional leaders in vocational education. With the support of the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung – BMBF) in collaboration with the Georgian Ministry of Education and Science of Georgia, the University partners created a TVET specific PhD Program and outlined a plan to ensure the continuity of the implementation process of that program through the establishment of a Graduate School.

The VoCasian project, a pilot initiative, directly aligns with Georgia's national vocational education reform agenda as outlined by the Ministry of Education and Research in 2013 [1]. This reform reflects the increasing need for structured programs to foster scientific talent in the field of vocational education research. The VoCasian project aimed to build comprehensive research capacities across the country and initiate scientific monitoring and exploration of corresponding concepts and solutions.

2 Graduate School within the VoCasian concept

The goal of VoCasian was to design and implement a demand-driven Graduate School at TSU, which was expected to facilitate research on the effects, challenges, and success conditions related to the implementation of such a program. The project's first objective was the establishment of a sustainable Graduate School to develop future-oriented concepts for the qualification of academic teaching personnel. The Graduate School, depending on the career paths of the doctoral candidates, will significantly affect vocational education practices and policies in Georgia, contributing to institutionalized vocational education research and consultancy.

The second objective focuses on concrete research activities, particularly concerning the conditions of learning and teaching, as well as labor market and vocational education research from political science and economic perspectives. Key research questions include the effects of the Graduate School on institutional learning and organizational performance of the target institutions, and the specific challenges and success factors in collaborating with stakeholders and integrating the Graduate School into Georgia's education system.

The implementation of the Graduate School was to include a four-semester PhD program designed to support the part-time scientific development of professionals. Building on a master's degree or equivalent, the program aimed to equip candidates with the ability to conduct independent scientific research that contributes to the development of vocational education, pedagogy, and related theories and methods. This program was set to be supplemented by an e-learning platform that facilitates blended learning arrangements to support the learning processes of academic personnel and PhD candidates, and promotes long-term networking among all participants.

Additionally, the project outline set a framework to provide PhD candidates with opportunities to participate in research colloquia in Germany, fostering multilateral exchange and international networking. In this sense, the Graduate School was envisioned as a central, accessible contact point for questions arising from the professional and operational practices of the target country, demanding scientific (empirical) processing and answering. These research questions would be brought to the Graduate School from various institutions, contributing to the exploration of previously unexplored fields and the development of vocational education as a scientific discipline.

In the long term, the Graduate School aimed to establish vocational education chairs at four partner universities in Georgia, thereby enhancing national and international vocational education cooperation and establishing an interdisciplinary and

transdisciplinary research network. With the second objective focused on answering the research questions related to institutional learning, organizational performance, stakeholder collaboration processes, and system prerequisites, providing a foundation for furthering and optimizing vocational education processes in Georgia.

3 Theoretical Background

Graduate schools play a pivotal role in facilitating research and professional development across various academic disciplines, including TVET. The structured environments they provide are crucial for supporting research initiatives, fostering professional growth, and promoting collaboration among diverse stakeholders such as academia, politics, industry, and vocational education institutions. Research has shown that graduate schools enhance research capabilities and outcomes by providing essential resources, mentorship, and collaborative opportunities, thus demonstrating how a structured environment can enhance research quality and scope [2].

3.1 Benefits of Graduate Schools

Graduate schools offer structured environments that are conducive to research, providing essential resources, mentorship, and collaborative opportunities. One of the core functions of graduate schools is to facilitate pedagogical research, essential for preparing future specialists. This process often involves developing soft skills such as general presentation and discussion skills paired with the ability to present in-depth knowledge to a specialized or wider audience. Graduate schools serve as incubators for scientific and pedagogical research, enabling students to develop and defend significant research projects [3].

Additionally, graduate studies provide avenues for professional development, enhancing competencies and contributing to comprehensive professional profiles. This dual role of graduate schools as facilitators of research and professional development is crucial for advancing the field of vocational education [4–5]. A structured environment not only supports the academic growth of students but also fosters a culture of continuous learning and development among faculty and researchers.

Crucially, graduate schools play a vital role in conducting tracer studies, which gather feedback from graduates and employers to refine TVET programs. These studies ensure that the programs remain aligned with market needs, making them more relevant and impactful [6]. Engaging stakeholders in research development is another critical function of graduate schools. Engaging stakeholders ensures that research activities address real-world needs and that the outcomes are practically applicable, which is vital for the evolving field of TVET.

Furthermore, a graduate school can function as a reference framework to integrate research transversally within degree programs, promoting the development of research competencies throughout the academic journey. This approach underscores the importance of embedding research activities within the curriculum to facilitate continuous academic and professional development. By making research a transversal

axis, graduate schools ensure that students develop strong research skills that are applicable across various contexts and disciplines [4].

3.2 Challenges and Success Factors in Stakeholder Collaboration

Despite the theoretical benefits of graduate schools in facilitating research, practical implementation often encounters challenges. Successful collaboration with stakeholders requires careful navigation of various factors, including:

Institutional Learning and Organizational Performance: The implementation of a Graduate School can significantly impact institutional learning and organizational performance. Research must explore how academic institutions adapt to new research environments and the organizational changes required to support these initiatives [7–9].

Collaboration with Stakeholders: Effective collaboration with stakeholders involves addressing their specific needs and expectations. This includes understanding the dynamics of working with political entities, industry partners, and educational institutions [10–12]. Identifying common goals and fostering open communication are essential for effective collaboration [13–14].

System Integration: Integrating a Graduate School into the national educational system poses challenges related to compatibility with existing structures and policies. Research must examine the systemic prerequisites for successful integration and identify potential barriers and enablers [15].

Professional Development and Networking: The professional development of academic staff and the creation of networking opportunities are critical success factors [16–17]. Implementing e-learning platforms and organizing international research colloquia are strategies to support ongoing development and foster global collaboration [18–19].

By addressing these challenges and leveraging the benefits of graduate schools, the VoCasian project aims to establish a robust framework for vocational education research and development in Georgia, thereby contributing to the broader goals of educational reform and workforce readiness. The project's development based on the Graduate School outline will be discussed in detail in the next section.

4 Graduate School Genesis in uncertain times

The VoCasian project was hit by the SARS2- Covid pandemic, which influenced its performance like many other international projects. In addition to that high political fluctuation within the University environment as well as on the national level during the project runtime meant that key decisions regarding the formal establishment of a graduate school were retained or could not be obtained at all. That said, within the project outline and via continuous effort to follow up on the project's achievements, a successful project application, following a call of the Competitive Innovation Fund (CIF) created in frames of a program – "Georgia I2Q – Innovation, Inclusion and Quality", approved by the Minister of Education and Science of Georgia, enables the continuous climbing of institutional hurdles.

So while a working framework is not yet fully established, activities of the proposed Graduate School were implemented successfully, culminating in the successful grant application mentioned above. As it were, the Graduate School in itself was set to predate the actual PhD program, which was designed, tested and accredited within the project timeline. The close collaborations needed to enable feasibility studies and stakeholder analysis for such a program were structured along the lines of an outlined Graduate School Charter, but the implementation of that charter proved to be the most difficult project objective and was therefore never met while related developments went along.

The need for the institutional approach of a Graduate school became clearer during the project implementation. Planned baseline studies and stakeholder analysis were successful if a concrete link between the TSU and the stakeholder existed – in these cases to collect interview data (cf. "Results of the BMBF project VoCasian" in this publication). Approaching multiple stakeholders through official channels to gather quantitative data failed on two attempts, due to a very limited reach, combined with extremely high dropout rates, putting an emphasis on the need to create and sustain networks to reach out to relevant stakeholders.

Developing the program with well-established links within the academic community proved more successful. In terms of conceptual development, the deployment of lecturers for in-person events in Tbilisi has proven beneficial. Any content-related feedback or comments on the implementation of the modules were immediately incorporated into the course design for the accredited program, thus ensuring not only the quality of teaching but also the practicality of the PhD program. Despite the practical infrastructure for digital implementation of the modules, feedback from those lecturers who were able to travel to Georgia and conduct on-site courses due to the later relaxed SARS-COVID-19 situation highlighted the advantages of in-person teaching compared to online-only teaching. It was noted that on-site teaching resulted in higher participation and learning motivation, as well as significantly more efficient content delivery. These insights were gathered through ongoing, study-related feedback discussions with lecturers and TSU officials, which are a key part of the formative evaluation. The instruments for summative evaluation of the program were applied to all previously conducted courses as part of the testing phase and were reflected upon for their suitability (cf. "Advancing PhD Programs in Vocational Education Across Kazakhstan, Uzbekistan, Pakistan, and India" in this publication). The intended educational needs assessments had to be initially collected diametrically through the channels of our project partners while in the long term, structured conceptual work under the umbrella of the Graduate School is intended by those responsible.

The testing of all modules was completed in the winter semester of 2022/23. Subsequently, the doctoral program was officially launched in March 2023 (post-testing) after its successful accreditation. Data from the pre-run led to the organization and implementation of the program in the Co-Teaching format, enhancing collaboration between Georgian and German academic staff, ensuring Georgian quality standards were met, and enabling a sustainable knowledge transfer to TSU staff. Particular em-

phasis was placed on the transfer of teaching content from the German to the Georgian lecturers through the co-teaching concept, i. e., the joint preparation and implementation of courses. Occasionally, misunderstandings or structural issues arose, which were always resolved in an unbureaucratic manner through mediation by the project managers. All these implementation processes, which are crucial for the long-term success and continuation of the program, were fully handed over to the multipliers at TSU to follow up on the structural development along the Graduate School framework during the Georgian I2Q (see above) project implementation.

Further content development steps especially in the area of extra-curricular student and staff training were also undertaken following the idea of the Graduate School implementation. For instance, in September 2022, a training measure on "Quality Assurance in Higher Education" was implemented for Georgian and German staff as well as other interested parties. After the accreditation of the program, a qualification course for students and interested parties from all disciplines on methodological tools for quantitative and qualitative empirical (social) research (SPSS, R, MAXQDA) was conducted. This workshop took place in Tbilisi and was well received, especially by the student body. To address the professionalization needs of the lecturers, another training offer was realized in January 2024, focusing on the adequate supervision of PhD students, particularly on the changing requirements and working methods at the doctoral level, as well as support mechanisms for journal publications. Furthermore, a seminar on "Augmented Reality/Virtual Reality in Higher Education" was being planned following collaborative efforts with the OvGU and the IFF Fraunhofer Institute in Magdeburg. The international profile and the interdisciplinary and cross-country network formation within a Graduate School framework are sharpened not least by those international experts who, in the context of their lecturing activities, contribute their high expertise and discuss cultural and educational policy differences. Furthermore, the product portfolio is continuously developed, and the visibility of cooperative project activities is increased.

In regard to publications, the joint publication at the ICERI Conference 2022 was an important first step to increase the visibility of the project results and to contribute to the emerging research activity in the field of the Georgian TVET system. A second step was the opportunity for Georgian PhD students and staff to publish together with their colleagues in this volume. Further chances will arise via more concrete research specific publication opportunities channelled via future Graduate School activity.

5 Conclusion

The VoCasian project emerged as a pivotal pilot initiative, directly responding to the national vocational education reform outlined by Georgia's Ministry of Education and Research. By focusing project efforts around the establishment of a Graduate School, the project sought to address the demand for structured research programs and to build extensive research capacities. The Graduate School will aim to facilitate research

on the effects, challenges, and success conditions associated with such programs, ultimately contributing to the institutionalization of vocational education research in Georgia.

Central to the VoCasian concept was the implementation of a demand-driven Graduate School at TSU. This initiative focused on developing future-oriented concepts for qualifying academic teaching personnel and influencing vocational education practices and policies in Georgia. The Graduate School was envisioned as a sustainable entity, providing structured environments conducive to research and fostering collaboration among academia, industry, and educational institutions. By offering resources, mentorship, and collaborative opportunities, the Graduate School aimed to enhance the quality and scope of research, particularly in the fields of learning conditions, labor market research, and vocational education from political and economic perspectives.

Despite facing challenges such as the SARS-CoV-2 pandemic and political fluctuations, the VoCasian project made significant strides. The project's activities, including the successful grant application through the Competitive Innovation Fund (CIF) and the subsequent launch and accreditation of the doctoral program, demonstrated the resilience and adaptability of the initiative. The collaborative efforts between Georgian and German academic staff, particularly through the co-teaching format, ensured the program met Georgian quality standards and facilitated sustainable knowledge transfer.

The framework of the Graduate School also highlighted the importance of stakeholder collaboration. Effective engagement with stakeholders, including political entities, industry partners, and educational institutions, is crucial for addressing specific needs and fostering open communication. The project emphasized the need for structured networks to reach relevant stakeholders and in doing so underscored the role of any future Graduate School in facilitating such collaboration.

Furthermore, the project's focus on professional development and networking was evident in the training measures and workshops implemented for Georgian and German staff. These initiatives addressed the evolving needs of academic personnel and students, enhancing competencies in areas such as quality assurance, empirical research methodologies, and PhD supervision. The international profile of the Graduate School was further strengthened through collaborations with international experts, contributing to a broader interdisciplinary and cross-country research network.

The VoCasian project's commitment to continuous content development and increasing visibility through joint publications and conference presentations also played a pivotal role in advancing the Georgian TVET system. By fostering an environment conducive to research and professional development, the Graduate School is poised to significantly affect vocational education in Georgia, ensuring that it remains aligned with market needs and international standards.

In conclusion, the Sustainable Institutionalisation of Project Results via the Graduate School Format represents a transformative approach to advancing vocational education in Georgia. Through collaborative efforts, structured research environments, and a focus on professional development, the initiative has laid a robust foundation for

the future of vocational education research and practice in the country. The lessons learned and successes achieved through the VoCasian project provide a blueprint for similar initiatives in other developing and newly industrialized countries, highlighting the critical role of graduate schools in fostering scientific research and professional growth in the TVET sector.

References

[1] Ministry of Education and Science of Georgia. (2013). VET Development Strategy for 2013–2020.

[2] Muaze, M., & Magalhães, M. (2014). Como promover pesquisa em EAD? Experiências do curso de licenciatura em história da UniRio. *Revista História Hoje*, *3*(5), 61–73.

[3] Lavrentieva, O., & Tsys, O. (2019). The theory and practice of managing students' independent study activities via the modern information technologies. *Technology Transfer: Innovative Solutions in Social Sciences and Humanities*, 41–44. https://doi.org/10.21303/2613-5647.2019.00931

[4] Inciarte Rodriguez, M., & Piñero Martín, M. L. (2022). La investigación como eje transversal en los másteres de la Universidad de Atlantis. *Revista EDUCARE – UPEL-IPB – Segunda Nueva Etapa 2.0*, *26*(3), 172–195. https://doi.org/10.46498/reduipb.v26i3.1836

[5] Zeph, C. P. (1991). Graduate study as professional development. *New Directions for Adult* & Continuing Education, *1991*(51), 79–88. https://doi.org/10.1002/ace.36719915110

[6] Shrestha, D. K. (2021). Graduate tracer study for refining TVET programs. *Journal of Technical and Vocational Education and Training, 1*(15), 100–111. https://doi.org/10.3126/tvet.v1i15.45172

[7] Hamzah, S., Nordin, N., & Mustafa, S. M. S. (2020). The Influence of Organizational Learning on Work Performance among Academic Staffs in Private Higher Learning Institutions. *International Journal of Academic Research in Business and Social Sciences*. https://doi.org/10.6007/IJARBSS/V10-I14/7691

[8] Tran, H., & Pham, N. (2019). Organizational learning as a moderator of the effect of employee participation on academic results. *The Learning Organization*. https://doi.org/10.1108/TLO-03-2018-0040

[9] Uslu, B., & Welch, A. (2018). The influence of universities' organizational features on professorial intellectual leadership. *Studies in Higher Education*, *43*, 571–585. https://doi.org/10.1080/03075079.2016.1185774

[10] Drahota, A., Meza, R. D., Brikho, B., Naaf, M., Estabillo, J. A., Gomez, E., Vejnoska, S. F., Dufek, S., Stahmer, A. C., & Aarons, G. (2016). Community-Academic Partnerships: A Systematic Review of the State of the Literature and Recommendations for Future Research. *The Milbank quarterly*, *94 1*, 163–214. https://doi.org/10.1111/1468-0009.12184

[11] Đurić, M. (2023). Development of international standards for university-business collaboration. *Proceedings of the 36th International Congress on process engineering*. https://doi.org/10.24094/ptk.023.371
[12] Voinov, A., & Bousquet, F. (2010). Modelling with stakeholders. *Environmental modelling & software, 25*(11), 1268–1281.
[13] Mäkinen, S. (2023). Internationalisation in challenging times: Practices and rationales of internal and external stakeholders. *European Journal of Higher Education, 13*, 126–141. https://doi.org/10.1080/21568235.2023.2196434
[14] Shenderova, S. (2022). Collaborative degree programmes in internationalisation policies: The salience of internal university stakeholders. *European Journal of Higher Education, 13*, 197–215. https://doi.org/10.1080/21568235.2022.2120035
[15] Bleiklie, I. (2005). Organizing higher education in a knowledge society. *Higher Education, 49*, 31–59. https://doi.org/10.1007/S10734-004-2913-7
[16] Ashar, M., Kamdi, W., & Kurniawan, D. (2021). Professional Skills Development Through the Network Learning Community Using an Online Learning Platform. *Int. J. Interact. Mob. Technol., 15*, 202. https://doi.org/10.3991/ijim.v15i12.21587
[17] Conrad, L. (1998). Enhancing research through academic staff development. *International Journal for Academic Development, 3*, 114–123. https://doi.org/10.1080/1360144980030204
[18] Donnelly, R., & Manathunga, C. (2009). *Opening Online Academic Development Programmes to International Perspectives and Dialogue*. 84–107. https://doi.org/10.4018/978-1-59904-814-7.CH005

Qualification of TVET Teachers in an International Context – Status and Perspectives

F. Bünning, G. Spöttl, H. Stolte

Worldwide, teachers are of great importance for the professionalization of the TVET sector. Yet, few initiatives are developing approaches to provide TVET teachers with competences for teaching and learning in technical vocational education and training (TVET).

The paper supports the fact that TVET teachers need a close connection between different areas of competences. On the one hand, they need professional skills (related to a professional field), and on the other hand, personal, social and work process-related competences as well as pedagogical and methodical-didactical skills on a scientifically reflected level. Developing these competences and enabling teachers to fulfil their duties requires a complex combination of all competence areas mentioned; in particular between the dimensions of "vocational pedagogy" and the professional discipline as a "subject".

The argumentation of the paper is underpinned by analyzing approaches of teacher training in selected countries and examples from various countries to meet this challenge and initiatives from political organizations to set standards that reflect the complex nature of teaching competences.

1 Introduction

The idea that vocational education and training should play a crucial role in social progress in any country is echoed in many policy documents. In recent years, this has increasingly become a shared firm belief among public and private education policy stakeholders around the world. Good evidence of this is the 2012 Shanghai Consensus, which includes recommendations on technical and vocational education. The document is an important message to UNESCO Member States to increase the relevance of vocational education and training everywhere [1].

With the increasing importance of TVET, the question of how and in which institutions the teachers working in this system should be educated, or are already being educated, is also coming more and more into focus. Likewise, it is highly relevant in this context to clarify which professional profiles would be appropriate for TVET teachers. This question will be explored here, and a case-based analysis will be used to show how TVET Teachers are educated in selected countries. The general importance that teachers have in different educational systems has been pointed out by Hattie [2] based on extensive studies, but without specifically addressing TVET.

Nevertheless, the need to educate teachers for the vocational education system is underestimated in many countries. Many planners assume that it is sufficient to have

teachers for vocational education who are qualified only one level higher than the target group to be taught. This widespread attitude is even supported by educational institutions and authorities, which results in no initiatives being taken to qualify teaching staff in both specialization and pedagogy and vocational pedagogy. This attitude is accompanied by the idea that vocational education is a simple teaching of skills and neglects the fact that these teachers must shape learning processes and be professionally qualified in selected content specializations, didactics, and vocational pedagogy. They have significant and wide-ranging tasks to accomplish, which are listed in the following grouping [3–4]:

I Learning support
- design of learning cultures,
- didactic design of learning processes,
- promoting motivation to learn from the use of different methods,
- didactic preparation of complex subject-related contexts,
- promoting learning processes,
- shaping of learning and educational processes,

II Quality, cooperation, curriculum
- securing quality development,
- cooperation with colleagues and extracurricular partners,
- designing curricula,

III Social tasks
- supporting identity development with the help of a professional image to be conveyed,
- support of sustainability,
- ensuring employability,
- support of social stability.

This list underlines the fact that vocational education and training is more than simple qualification or simple knowledge transfer. Teachers in vocational education and training take on important social tasks, as they train skilled workers who must ensure a high quality of their work in companies and are also expected to be promoters of innovation. TVET teachers must also ensure that the respective requirements of industry, the private sector and the public sector are quickly integrated into vocational training. This can only succeed if teachers are professionally educated and prepared to handle such wide-ranging tasks. Professionally trained teachers have the advantage that they can be flexibly deployed to teach target groups with different levels of expertise, and they can help to improve the image of vocational education [5]. In addition, these teachers can convey social and labor policy requirements and promote design competence. This means that they support the development of the action competence of the target groups being trained. This is a central prerequisite for quality work, the ability to innovate and

for participation in societal tasks. The implementation of the promotion of action competence includes the following tasks:

- planning of teaching processes in different environments,
- organization, structuring and support of learning processes (learning support in selected subjects) under the claim of sustainability,
- carrying out assessments/evaluations [6] and collaborating with colleagues and stakeholders in the vocational education system.

These areas of responsibility require not only theoretical knowledge but also practical skills, which the teaching staff must address in addition to subject knowledge and skills. According to the Council of the European Union, teachers should "stimulate (...) learners in a holistic way to develop their intellectual, emotional, social and creative potential while ensuring their educational progress" [7].

2 Methodological Research Approach

The papers' findings were elaborated on the basis of a meta-analysis, which seeks to analyze existing primary data under the perspective of a different research question. A meta-analysis summarizes the most current state of research by aggregating individual empirical results from content-related homogeneous studies [8].

In the case of this paper the primary data is provided by country reports published in the source:

- Bünning, F.: Spöttl, G.& Stolte, H. 2022: Technical and Vocational Teacher Education and Training in International and Development Co-Operation – Models, Approaches and Trends. Singapore.

For critical reflections the study of Euler is included for a supporting analysis:

- Euler, D. 2018: TVET Personal in ASEAN. Investigation in five ASEAN States. Detmold.

Moreover, additional material (unpublished) provided with the country reports was considered as well.

The publication by Bünning, Spöttl & Stolte [9] mainly includes position papers of internationally active stakeholders such as UNESCO, UNEVOC, ILO, EFF, OECD, ADD and CEDEFOP, as well as policy papers of selected governments of individual countries. Only in a few cases, such as the USA, Germany, Indonesia, Malaysia and Spain were these papers prepared by researchers.

The second publication mentioned [10] focuses on the analysis of TVET teacher education in five selected countries: Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam. The interest of this research was to gain insights into the development and educational policy support for teacher education in TVET. It focuses on questions such as the

- relevance of TVET personnel for development in ASEAN,
- different forms of pre-service and in-service training,
- kinds of career development,

- differences and similarities of TVET teacher training with the idea of clustering,
- demand of TVET teachers in the ASEAN region and others.

The results of the two publications were used to provide data on structures, and in-service models and the importance of pre- and in-service teacher training in TVET. The Euler study [10] was used to support the findings of the main study [9] and to validate the data.

However, a meta-analysis is not an empirical instrument of its own, it applies other empirical/statistical tools to generate new perspectives and insights. One fundamental requirement to apply a meta-analysis is the definition of the selection criteria, which are applied to choose primary studies [8].

In this case the criteria were the following:

- the papers must address TVET policy of a country or region,
- models of TVET teacher education must focus on an academic approach,
- the papers' authors must have authentic access (first-hand information) to details provided in the country reports,
- models of TVET teacher training have to focus on pre-service and in-service training,
- a dynamic economic development should require TVET training.

As a result, the following country papers have been analysed: Cambodia, Moldova, Vietnam and Germany. Thus, country reports from listed countries were examined to outline central tendencies in TVET teacher development. The Euler study was used to support the findings of the main study [9] and to validate the data.

As mentioned above, a meta-analysis applies other empirical tools. The basis for this study was set by individual country reports. In consequence the authors dealt with qualitative data and decided to apply the document analysis and to break down the core issues addressed in the various country reports.

As a document analysis is focused on clear questions [11], the following questions were formulated:

- What are the concepts und responsibilities of TVET teachers?
- How are TVET teachers qualified? What models of TVET teacher development are applied?
- What core competences are addressed in TVET teacher programs?
- Do standards for TVET teacher education exist at national or regional level and how do they link up to international standards?

The research findings are summarised in the following chapters.

The topic of teacher education in TVET is very diverse and the discussion about it is driven by educational policy. Therefore, on the one hand a classification is needed and on the other hand this diversity should be shown in discussions. This is done in the next chapters. Chapter 3 elaborates the research findings. Chapter 4 to 6 embed the findings in a larger perspective of developments in TVET teacher education and define standards as a framework for teacher education.

3 Research Findings: TVET Teacher Education Programs in Selected Countries

As outlined in the research design in Chapter 2, four countries will be selected according to the criteria explained there to work out which concepts and levels are implemented in the TVET teacher education programs and which design concepts and responsibilities are assigned to the teachers.

3.1 Selected countries

Based on the key selection criteria (see chapter 2) such as the existence of

- a visible TVET policy in a country,
- an academic orientation of TVET teacher education,
- an authentic access of the authors to the underlying TVET papers of a country,
- implementation initiatives for pre-service and/or in-service TVET teacher education programs,
- and economic developments that make TVET training necessary.

The documentations mentioned in Chapter 2 were analyzed to decide which countries should be selected.

The document by Euler [10] was relatively easy to study because the empirical part documented TVET systems and teacher education programs in a very focused way. The document of Bünning, Spöttl & Stolte [9] consists of 27 individual documents with very different approaches. The selection was facilitated because the 27 individual documents could be categorized into four groups. In group one, the contributions of internationally active organizations were documented. These presentations were used in this article to place identified developments in educational policy discussions. The other three categories differentiate according to countries that are economically

- less developed,
- almost highly developed and those that are
- highly developed.

In order to get a picture of the different levels of development according to the selection criteria, it was decided when selecting the countries to follow the established criteria, but to selected

- two countries from the economically less developed area, and
- one out of a country that is economically almost highly developed and one that is
- among the highly developed countries.

An initial comparison of the selection criteria with the countries documented in the sources showed a high degree of correspondence with the country-specific developments in many cases. However, because the overall aim of the selection was to demonstrate that although TVET and the associated teacher education are progressing at different levels of development in many countries and regions, noticeable differences can

be observed. The above-mentioned differentiation in the selection into three groups was pursued. The economic component gained in importance in the selection because in many countries the orientation of TVET towards the requirements of the labor market is gaining in significance. Four countries were selected (cf. Table 1) because, due to the development constellation, it can be shown in these cases at which stage of development the countries in a region are, which concepts they pursue in TVET teacher training and how the responsibilities are distributed.

Table 1 shows that the four selected countries fulfil the selection criteria. Only in Cambodia is the TVET teacher education not based at universities, but at an institute (College) that carries out teacher education on behalf of the government.

Table 1: Selection of four countries

Selection Criteria (3.1)	Selected Countries			
	Vietnam	Cambodia	Moldava	Germany
TVET policy	Yes	Yes	Yes	Yes
Academic TVET teacher education	Yes	Special institute	Yes	Yes
Direct access to TVET planning	Yes	Yes	Yes	Yes
Pre-service/in-service teacher education	Yes	Yes	Yes	Yes
Economic development	Yes	Yes	Yes	Yes

In the selection process, care was also taken to ensure that the above-mentioned three country categories were taken into account. With the selection made, all three country categories have been taken into account:

Table 2: Country categories in development

Country	Category
Vietnam & Cambodia	less developed
Moldova	almost highly developed
Germany	highly developed

3.2 Economic situation and TVET

Vietnam and Cambodia

The rapid development of the South-East Asian region and the economic upswing of the individual countries mean that vocational education and training is increasingly taking center stage. This is not without consequences for the further development of vocational education and the training of teachers for vocational education systems. The example of two countries – Vietnam and Cambodia – will be used to illustrate the devel-

opment process taking place in teacher education in the Asian region. Vietnam is an increasingly strong economic region with a high pace of development and modern industrial enterprises, especially in the manufacturing sector. Cambodia, on the other hand, is developing much more slowly and is characterized by small enterprises. In Vietnam and Cambodia, initiatives have been taken to qualify teachers for developing vocational training concepts. Approaches and procedures vary considerably from country to country.

Although the TVET systems in Vietnam and Cambodia differ markedly, there is a significant gap between TVET and the labour market in both countries. "The education system at universities or colleges (where most of the personnel is trained) and at TVET schools (where TVET leaders are employed) is to a large degree separated from the economic system and the labour market (where graduates from TVET programs seek for employment)" [10]. In both countries, it is difficult to link specialized TVET teacher education programs to practical application in the workplace [12–13].

Moldova

Moldova, another selected country, is oriented towards European developments because it sees chances for membership in the European Union.

For more than 5 years, Moldova has implemented extensive reforms in the field of technical vocational education and training (TVET). The reforms are in line with Moldova's TVET Strategy 2013–2020 and seek to transform and to modernize the TVET system offer according to the needs of the private sector. The first steps were to restructure the network of TVET institutions, along with the adaptation of the regulatory framework for a more responsive TVET system. A new approach was undertaken for the process of curricula development with creating more practical and work-relevant competence in students [14].

Germany

Germany is characterized by an established TVET system that is well organized. Considerable efforts have been made to ensure a close link between TVET and the labor market. Teachers are trained at universities to support the TVET system.

The impact of the Bologna Process on higher education in Europe can be seen in many aspects of university provision, not least in the area of Initial Teacher Training for TVET. This sector faces particular challenges given its connections with employment and industry. As European universities approach the deadline for the achievement of the requirements set out in the Bologna Process, a new body of research is beginning to reveal emerging trends and new challenges created by the recent changes to programs and processes both within individual countries and throughout Europe. Such research is already serving as an important touchstone for policy makers and curriculum developers in monitoring the ongoing success of the development of a cohesive Higher Education Area as recommended by the Bologna Process.

The development of a cohesive Higher Education Area has involved the structural realignment of degree systems. Ironically, this has created greater diversity within the

(German) TVET Teacher Education system than was previously the case. This diversity has given rise to complexities which may serve as a new discourse for sustainable development in TVET Teacher Training not only against the backdrop of the Bologna Process but also for developments on a wider international scale [15].

3.3 Concepts of Teacher Training and Responsibilities of Teachers' *Responsibility*

Responsibility for pre-vocational training is affiliated with a ministry in all countries. In Vietnam, the main responsibility is with the Ministry of Education. In Cambodia, responsibility is divided between the Ministry of Education and the Ministry of Labor and Vocational Training. The qualification of teachers for vocational education in Cambodia is increasingly carried out by the Ministry of Labor. The importance attached to the training of teachers for vocational education depends primarily on whether the latter is anchored in the ministries in a separate department that has the necessary competences, or whether it is part of departments with other competences. In the second case, the resources devoted to teacher training for vocational education are limited.
The responsibility for teacher qualification in Moldova is in the hands of the Ministry of Education [16]. Qualification at university level is represented there as an objective. In Germany, responsibility for the implementation of TVET Teacher Training lies with the Ministers of Education and Cultural Affairs of the 16 Länder. The Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (Kultusministerkonferenz) is responsible for shaping the framework conditions [9].

Concepts

Teacher training approaches vary considerably from country to country due to different cultural contexts and requirements, as the following evidence shows.

Cambodia & Vietnam

In Cambodia and Vietnam, it is noticeable that in-service training is not set up exclusively as Bachelor's degree programs (see Figure 1 & Figure 2). Certificate courses are offered by continuing education providers that are recognized by the ministries. The character of the programs is usually very different, which is expressed in a wide variety of certificates. A special feature of the diverse programs in both countries is that most program types include practical phases of up to one year. In Vietnam, 25 percent of the duration of the technical teacher education program must be completed in university workshops and companies. The diversity of approaches in Vietnam reflects the fact that there is no orientation to overarching standards in program design. In Cambodia, the diversity of programs is lower, but standards have hardly played a role there either [9–10].

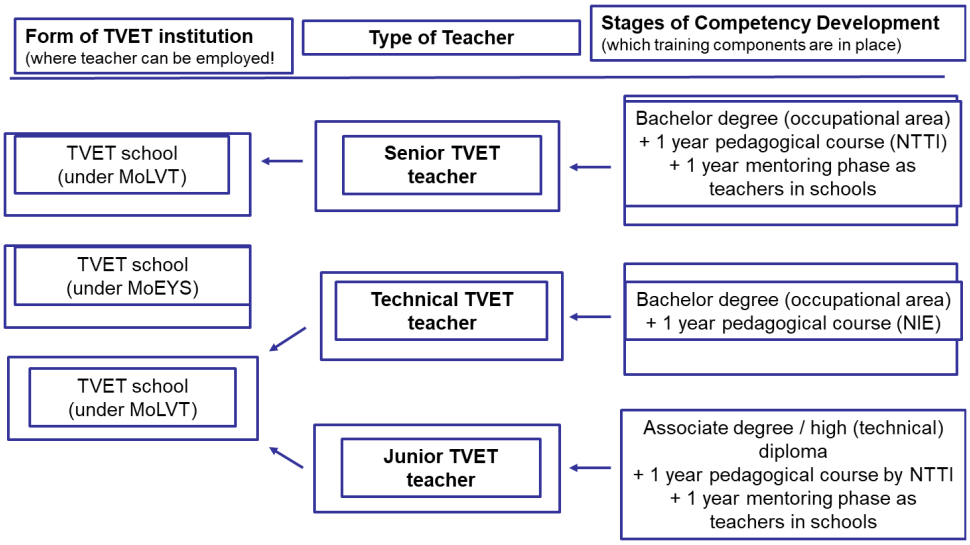


Figure 1: Cambodia [10]

Note: NTTI = National Teacher Training Institute

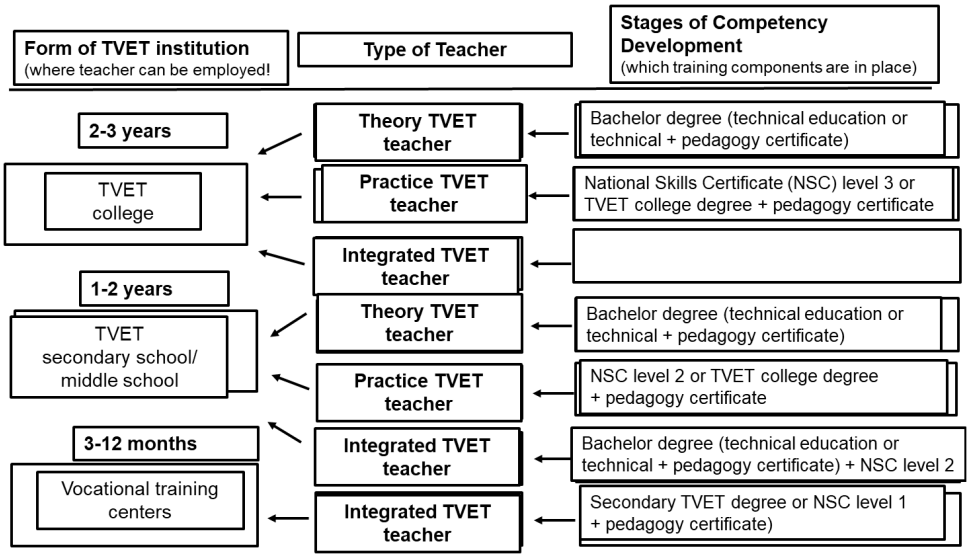


Figure 2: Vietnam [10]

Note: NSC = National Skills Certificate

In Vietnam, there are, on the one hand, programs that follow the consecutive concept and, on the other hand, so-called "concurrent programs" with simultaneous technical and pedagogical emphases. In some of the programs, a bachelor's degree can be

earned, in others a certificate in pedagogical or technical studies, or both. The level depends on the type of school for which students qualify.

"Cambodia distinguishes between junior degree programs, which require an associate degree/diploma, and senior degree programs, which require a bachelor's degree for admission." [9–10].

Moldova

In Moldova, this is a university Master's degree that can be earned by building on a subject-related Bachelor's degree. In this country, comprehensive reforms in the field of vocational education and training have been implemented for more than 5 years. They are in line with the Moldovan TVET Strategy 2013–2020 [17] and aim to transform and modernize the TVET system and adapt the provision to the needs of the private sector. The first steps were to restructure a network of TVET institutions and adapt the legal framework to establish a more responsive TVET system. Another step was the development of curricula to place more practical and work-related skills at the center of the skills development process.

A noticeable weakness to date is that training personnel do not have the competences that a modern vocational training system requires. Therefore, continuing education courses for TVET institutions and their teachers are offered by universities, but they do not cover all the needs and are not accepted by all teachers. It is expected that teachers will continue their education, according to the needs of the TVET centers. This goes hand-in-hand with encouraging teachers to develop a professional development portfolio by engaging in ongoing professional development programs. Currently, a Master's degree program (cf. Figure 3) for vocational education of teachers is under development in cooperation between the Technical University of Moldova and the University "Otto von Guericke" Magdeburg (OvGU) [14]. Without exception, the study program concepts are organized in modules and are handled flexibly. Each country offers multiple pathways for studies that open up the chance to pursue different employment opportunities and different teaching roles.

UNESCO	OvGU Modules	1st Semester					2nd Semester					3rd Semester					4th Semester					Work load		Proof of Performance	
		CP	HpW				CP	HpW				CP	HpW				CP	HpW							
			L	S	P	I		L	S	P	I		L	S	P	I		L	S	P	I	TP	SS	PS	TE
M1	(CM1) Principles of in-company vocational training and vocational didactics	10	2	2	2	1																98	202	***	W
M2	(CM2) Structures and theories of vocational education	10	2	2																		56	244	***	W
M3	(CM3) Didactics of learning and teaching	10		4																		56	244	***	TP
M4	(CM 4) Evaluation and Research Methodology						10		4													56	244	***	TP
M5	(CM5) Management and evaluation of vocational education						10		4													56	244	***	TP
M6	(CM 6) Curriculum and media development						10		4													56	244	***	TP
M7	(CM7) Specialisation in Vocational Discipline											10		2								28	272	***	R
PS	Practical Studies											10		2								(-)	(-)	(-)	(-)
M8	(WP) Specialisation studies											10		2			10		2			168	732	***	**
M9	*Master's thesis*																20		2			28	572	***	MA
	Sum per semester	30	4	8	2	1	30		12			30		6			30		4			602	2998		
Total-CP		120																							

Figure 3: OvGU UNESCO based curriculum outline

Legend: M Module, HpW Hours distribution by activities**,** TP Face to Face Teaching Hours, SS Workload in Total, TE Examination Form, L Lecture, S Seminar, P Practical Lesson, PS Credit Value.

Germany

Germany has introduced a two-cycle system in TVET teacher training.

The degree system at both the national and international levels was supposed to follow comparable frameworks. The first-level degrees should offer access to second-cycle programs and second-cycle degrees should give access to doctoral studies. The new two-cycle-system in TVET Teacher Training marks a radical change in the training of TVET teachers. The traditional system consisted of one-block degree programme at university lasting from four to five years with two *Praktikum (internship)* placements. The standard period of study finishes with the first state exam, which is followed by a probationary period (*Referendariat*) of one and a half to two years and finishes with the Second State Exam. Since the two-level-system only applies to the period of study which takes place in university, TVET Teacher Training curriculum designers are faced with a particular challenge when considering how to map the traditional probationary period against the new structures.

Providers of TVET Teacher Training envisaged that the introduction of a two-level-system would result in new career opportunities for future graduates. The possibility for graduates to exercise flexibility in career choices on the completion of each degree was an aspiration of German curriculum designers for TVET. It was hoped that the new system of two levels of degrees would free graduates from a single career path (teaching) by enabling them to opt for alternatives at different stages of their course of study. This element was considered an important aspect of a rapidly changing job market [18–19].

3.4 Overall Findings

In general, the teacher education programs in the four countries studied are very heterogeneous. This is also true for the TVET systems. The degree of diversity among TVET teachers is correspondingly high when comparing the countries.

On the one hand, Germany follows the Bologna profile, while Cambodia and Vietnam have developed their own concepts. Moldova, on the other hand, follows European approaches with some affinity to the Bologna profile. The approaches reflect the political, cultural, economic and social differences between the countries. An orientation towards higher standards is at best marginal. This can also be seen in the further planning steps for the expansion of the programs in the countries under consideration. Even if overarching standards can serve as an orientation for the further development of the programs, it should be noted that ultimately regional needs have priority. This is also reflected in the fact that economic developments and educational policy requirements play an important role in all countries. The latter include requirements for social integration, violence and conflict management, sustainability and others.

For Cambodia and Vietnam, the results of the analysis of program approaches can be summarised in three points:

1. Promotion of the quality of learning in vocational education.
2. Vocational pedagogical competences of the teaching staff including the design of learning.
3. Specific competences of TVET teaching staff related to subject areas.

These three components require comprehensive, solid teacher training. This can only be achieved within the framework of professional, pre-service teacher training.

Looking at the current training structures, it can be seen, on the one hand, that standards and regulations are very broad and, on the other hand, they have standards which have not played a particular role to date. This is particularly true for Cambodia, but not for Vietnam. Vietnam has national standards, but these are not applied across the board, but selectively at the operational level. However, they are playing an increasingly important role in the accreditation of vocational schools and the competences of teachers.

In summary, the design and implementation of pre-service teacher education for vocational education is very different in the two countries. The differences are even greater for in-service programs. The reasons for this can be attributed to the different development of the education systems and the different responsibilities of the ministries.

For Moldova, the main issue is to continue on the path it has taken. This includes points such as the following:

- *Development of visual teaching materials* (creation of visual didactic materials according to learning outcomes and educational approaches; adopting an individual approach to visualizing educational contents; elaboration of visual didactic materials using diverse artistic and technological approaches; assessment of the quality of didactic visual materials.

- *Training of teaching skills knowledge* (designing specific training strategies for teaching-learning-assessment of facts, concepts, principles, processes and procedures; creation of project type curricula – learning matrix "Performance-Content" in theoretical training; creation of project type curricula – didactic project.
- *Assessment of practical skills* (assessment of learning outcomes; creation of assessment criteria for objective evaluation of learning outcomes; development of test instruments for the assessment of learning outcomes; application of procedures for increasing validity and reliability of test instruments; interpretation of assessment results to improve the quality of training) [14].

To stabilize the developments, the Technical University of Moldova has taken the initiative to establish an initial pre-service training program. In cooperation with national and international partners, the planned program will be established in accordance with the UNESCO/UNEVOC standards [19]. The Otto von Guericke University of Magdeburg supports this process.

Relevant dialogue partners at the national level, such as the Ministry of Education and Research, higher education institutions, the National Accreditation and Quality Assurance Agency and dual partners from both TVET providers and the business sector analyzed and discussed the various elements and necessary steps to be considered for the study program development. This includes adjustment of the normative framework, accreditation procedures, teaching and learning material development, as well financial aspects. Last but not least, the need for the further capacity development of potential lecturers to be incorporated into the implementation of the Master study program in Moldova was identified.

As a result, a draft work plan with milestones, activities and deliverables was outlined and agreed with the objective to start the implementation of the MA Study Program at the Technical University of Moldova from September 2021 [14].

For Germany, it is no longer a question of professionalizing the training of TVET teachers but of positioning the study programs within the universities and of which model should be favored. Should it be the

- Consecutive
- Top-Up and/or
- blended model ?

The discussion focuses on the achievable quality for future tasks, the adaption to digitalization, the possible restriction of theoretical and practical training and the depth of academic training [15].

As the demand for TVET teachers in Germany is increasing, in particular technical vocational domains, the Bachelor-Master-Models are also intensively discussed. Special regard is given to their potential to recruit and prepare career changers for teaching positions in TVET providers. As elaborated, the Top-up-Model bears significant potential to meet this increasing demand.

Based on the deficits outlined above, the countries of Southeast Asia have taken the initiative to formulate cross-national standards. This situation is outlined in Chapter 6. However, before standards can be designed, it is necessary to clarify the status of teachers in TVET in more detail. This is done in Chapter 4 on the basis of publications. Another prerequisite for standards is to clarify the role and tasks of teachers in TVET and what competences are required for this. This is also discussed based on publications in Chapter 5. Chapter 6 then discusses possible standards for TVET teachers, focusing on the design of learning.

4 Status of Teacher Education and Positions of Stakeholders

In many countries, the education of teachers in vocational education (which includes the training of trainers) is still seen as something that can be done "on-the-job". Often, there are no career paths available for teachers-to-be or trainers in vocational education, and there are no clear training pathways for training instructional staff, either through pre-service and in-service programs or through other solutions. The inadequate training of teaching staff leads to multiple difficulties in the quality of vocational education and training because the staff is not able to work in a quality-oriented way [20].

A number of international guidelines from the last decade reflect the growing importance of vocational education and training. These include the UNESCO Recommendation on Vocational Education and Training [21] and the UN Sustainable Development Goals Framework [22]. TVET is among the key factors in promoting an economically productive workforce. However, it is also significant for personal development and social cohesion, which are necessary for a sustainable future.

Particularly in low-income countries, the supply of vocational education is limited, spending on it is low, and the quality of teachers and programs inadequate. A study conducted by UNESCO-UNEVOC [23] found that the reason why TVET teacher training is not mandated in various countries, is not a lack of funding or awareness of the usefulness of in-service training, but rather a lack of systems and/or trained personnel with the appropriate knowledge and experience to provide expertise.

The paper "Teachers in the Asian-Pacific" [24] has identified further implications for TVET personnel. According to this paper, skills must

- "go beyond the mastery of job-specific skills;
- the focus must be on developing high-level cognitive and non-cognitive/transferable skills (problem solving, critical thinking, creativity, teamwork, communication skills, and conflict resolution)."

Finally, there is a call for increased cross-border recognition of relevant qualifications and quality assurance processes, which will have a direct impact on teacher and student mobility and teacher evaluation processes [24].

Given the challenges facing professional education, more attention needs to be paid to changing the attitudes, approaches, and professional activities of teachers and trainers [25]. Several multifaceted tasks continue to arise in situations where teachers and educators inevitably have a larger role to play than in the past in successful reform and innovation. Yet often, too little attention is paid to the training and development of TVET educators in particular [26]. It is therefore crucial that TVET personnel receive more attention in international education policy discourses. The growing importance of TVET, its specialization in linking education and employment, and the complexity of TVET teaching are good reasons for more international peer learning and international guidance in this area [27]. In a recent policy review of the OECD [28], a central role is assigned to teachers in vocational education, who must have a "dual qualification" that includes both pedagogical and knowledge of industrial practice. Corresponding to changes in labor market requirements, it would be necessary on the one hand for changes to take place in the vocational training landscape and on the other hand for teachers to be equally qualified regarding new pedagogical approaches, the use of new technologies in teaching, and with regard to the realities of the world of work.

It is recommended that programs for efficient initial and in-service training of teachers in vocational education provide pedagogical skills, digital and social competences as well as professional skills and knowledge needed in the labor market. With this in mind, the relevant curricula for initial and continuing teacher training must be kept continuously up to date and implemented in close cooperation with vocational training institutions. Offers of practical vocational learning opportunities in industry as part of teacher training are seen as particularly helpful.

According to the OECD, changing teaching and learning environments as well as the changing demands of the labor market mean that teachers in vocational education and training must permanently develop and expand the necessary competences after completing their training [28].

Similarly, the Council of the EUROPEAN UNION [7] formulated conclusions for the qualification of teachers for the future:

- The continuous professional development of teachers and trainers should be regarded as a prerequisite for high-quality education and training. Teachers and trainers should therefore be encouraged to reflect on their methods and their need for further training and to be motivated and supported in this respect by offering high-quality further training opportunities and creating incentives.
- Education and training institutions should be encouraged to create effective and research-based opportunities for teachers and trainers to engage in ongoing professional development based on collaborative approaches, peer observation and peer learning, consultation, mentoring, and networking. Education and training institutions, as part of developing such opportunities, should be encouraged, where appropriate, to expand their learning offerings to include smaller learning units, such as those for which "microcredentials" [7] could be awarded, with provisions for quality assurance.

- A specific orientation with regard to education and training should focus on measures that take into account the physical, virtual or integrated mobility of teachers and trainers in their learning, development and internationalization strategies, also using the potential of European instruments such as e-Twinning and EPALE (Electronic Platform for Adult Education in Europe) as an integral part of this [7].

The preceding remarks on TVET Teacher Training underpin the broad requirements for TVET Teacher Training for TVET, but leave open which institutions are primarily considered for this. In addition to describing the wide range of requirements depending on developments in the employment system, it is generally left open at which institutions teachers should preferably receive both initial and in-service training (pre-service and in-service). This situation leads to considerable uncertainty among planners of teacher training at the national levels. In addition, there is a wide variety of national positioning of different actors at the national level as soon as it comes to teacher training and quality.

The following chapters are intended to help clarify these issues as much as possible.

5 "Categories" and Responsibilities of Teachers in Vocational Education and Training

One of the fundamental questions about TVET teacher education will be clarified below. This is the question of the profile. There has hardly been any more extensive empirical research work on this to date. The reason for this is probably the fact that TVET is not present at universities in many countries and the field of research is of a complex shape. From the German-speaking world, one publication in particular is worth mentioning: Hartmann [29]. Also worth mentioning is the project consortium of the EU Asia-Link Project, which dealt with "Development of Transnational Standards" on TVET Teacher Training and contributed to clarifying the question [25]. Five university institutes from four countries (Germany, Spain, Malaysia, and Indonesia) were involved in the project.

5.1 Conceptual "characterization" of teachers

The understanding of the terms *teacher, trainer and instructor* varies greatly from country to country, from organization to organization, from author to author. UNESCO [30] explains the terms as follows:

- "Teachers" work in lower secondary or upper secondary institutions where they teach either theoretical subjects or practical skills in programs recognized as vocational or technical, or they teach general subjects or basic skills (such as mathematics) to students in technical or vocational schools.
- "Instructors" work in training centers that are not lower secondary or upper secondary schools. Typically, such training centers are primarily under the responsi-

bility of the Ministry of Labor or the Ministry of Training rather than the Ministry of Education, and the focus of instruction is more on skills and job preparation than on technical or vocational expertise. It is primarily workshop-based rather than classroom-based.
- "Trainers" work for companies, where they typically provide on-the-job training to employees. This may take the form of continuous, workplace-based learning for employees, or trainers may support the workplace-based portion of vocational training in a dual system.

The characterization of the different roles of teachers in connection with the respective terms is comparable with numerous descriptions, but nevertheless subtle nuances in the formulations contribute to confusion related to the concrete use of terms. Attribution to learning environments, institutions, or ministries, as practiced by Stanley et al. (see [30]), varies from country to country. Teachers work in many different types of institutions. The close institutional linkage mentioned here creates some barriers to general use of the terms across institutions. The term "instructor" described above is not always accepted in this explicit form and is often closely associated with the term "trainer." In the article, the term "teacher" is used in the first place and is somewhat flexible. The terms "instructors" or "trainers" are used when the described role is also involved.

Priority should be given to the term "teacher" in a way that this is a person who is very flexible in teaching assignments, who can perform all tasks in the classroom and laboratory in any case. The term "trainer" should be used primarily to refer to persons in operational assignments, and instructors usually provide hands-on instruction in school workshops. They cooperate closely with the teachers.

5.2 "Profiles" of TVET Teachers

It has already been pointed out that teachers must meet a wide variety of requirements. How a standard profile for TVET teachers can be configured is worked out on the basis of a literature analysis.

- Literature from countries that already train TVET teachers [31, 32; 20] will be used as a basis, and
- Sources from international stakeholders are evaluated [33, 34; 28; 35, 36, 19].
- Sources from researchers [3, 29, 37, 25, 38].

The analysis of the documents makes it possible to distinguish between three main areas of tasks and competences: a) overall tasks, b) broad competences and c) specific competences.

5.2.1 Overall Tasks of Teachers

Vocational teachers must be able to handle a wide variety of tasks. These include:

- designing the curriculum content as learning subjects for the occupations, both theoretically and practically; and

- to prepare the curriculum content in such a way that students at the various levels are supported in developing vocational competences and are motivated to understand and reflect on theoretical and practical contexts.
- preparation of learning environments for supporting learning processes.

Both tasks require vocational education teachers to be able to plan a teaching and learning process and to design its implementation.

5.2.2 Broad competences

Teachers must have access to students and understand what is required of them. The general competences required to achieve this goal are:

- analytical competences related to learning in vocational institutions (school, company, training workshops, etc.) and learning based on the requirements of the world of work,
- different pedagogical-didactical approaches and concepts must be available in order to apply them for targeted competence development,
- teachers should act in a pedagogically appropriate way in the organization and development of their vocational training centers, training institutions and colleges,
- practice cooperation with colleagues and companies, and
- promote the development of a vocational identity among students,
  - pursue compliance with legal requirements,
  - identify and address possible personal needs for their own professional development,

Based on the operational requirements for students, teachers must keep in mind the "holistic teaching practice".

5.2.3 Specific competences

The work content of teachers in vocational education focuses on planning, implementing, evaluating, and assessing their own teaching against the background of existing standards and frameworks. The competences required for this include:

- analyzing occupational standards and profiles, curricula and company requirements and designing pedagogical processes (objectives of competence development, selection of relevant content, structuring the approach to teaching according to factual, procedural and didactic aspects with the intention of developing competences in trainees and students in different learning environments);
- understanding the changing world of work, including technological innovations in work and business processes in companies and other industries;
- ability to analyze work processes in companies and to link important content using learning environments and the design of appropriate learning tasks. This promotes an understanding of (work) processes and their specific content, as well as learners' ability to also reflect their own behavior;

- align lesson planning with curricular objectives and topics. Teachers plan the use of methods and media in existing learning and working environments, taking into account the individual needs of learners in their specific situation;
- preparation of students for their future work in a specific occupation by selecting appropriate learning and work tasks for them. In this way, vocational teachers encourage students to develop their technical knowledge, problem-solving skills and soft skills during practical work in their occupation and in the vocational training they have chosen;
- promote self-organized and cooperative learning through the use of student- and activity-based instructional methods and digital media;
- ability to consider selected teaching methods that address differences among students (heterogeneous learning groups);
- plan the systematic development of subject, social and human competences and to promote the development of reflective and meta-cognitive competences as well as the corresponding methodological competences;
- ability to link practical and theoretical learning units in workshops and other learning environments;
- ability to intensively promote the development of professional action competence by opening up professional contexts and complexity and to support students in their learning processes in order to enable them to make informed decisions in all professional challenges they face;
- develop and implement balanced, indicator-based performance assessment to ensure individual student growth.

Teachers in professional education who meet these requirements are referred to as fully credentialed teachers.

It is very clear that in addition to subject-specific competences, there are also very broad competences and multiple tasks to be mastered by TVET teachers, the thorough exploration of which is necessary so that teacher education programs can be developed.

5.3 Significance of the Profile

The generated profile for TVET teachers proves that they are burdened with very diverse tasks. In order to cope with the tasks at high quality, a professionalized education is necessary, which is qualitatively at least on Bachelor level, better on Master level. For countries that wish to make TVET successful, a TVET teacher training program at the mentioned levels is part of it.

To achieve this, both educational policy and professional persuasion are needed. Due to the weak image of TVET in many countries and often prevailing very short training programs, the need for professionalized teacher education programs is rarely seen. An answer to this situation might be to establish standards for supporting a professional teacher education process.

6 Standards for Teacher Education – International versus Regional Concepts

The standards presented below are generated from the research findings presented in the article, from the literature review mentioned above and from expert discussions in the countries whose teacher training models are outlined in the article. The representations are to be understood as a framework that needs to be backed up by further empirical research.

6.1 Transnational frameworks

A number of aspects concerning the relevance of standards anchored in international frameworks, policy documents and declarations have already been addressed in the "Hanghzou Declaration" [19], which calls for international cooperation efforts for TVET education and training:

- TVET should be developed into an internationally recognized scientific community.
- Sustainable, transferable, and innovative national science systems should be developed and integrated into national innovation systems.
- International exchange of learners and teachers shall be accelerated.
- Expertise in vocational education pedagogy is to be linked to vocational disciplines and to integrative perspectives on school-based and work-based learning.
- Improving vocational skills to ensure employability is only possible by improving the quality, effectiveness, and relevance of instruction.
- Effective interaction between teachers and learners should be at the heart of quality vocational education.

As a result of the intensive exchange of ideas and discussions among experts during the Hanghzou meeting, an "international framework curriculum for a Master's degree in vocational education and training" was proposed to define the following:

- a set of quality criteria for training teachers and lecturers in education and training,
- a framework for future international academic cooperation,
- a basis for mutual exchange of students, lecturers and researchers,
- a framework that can provide a basis for mutual recognition of academic achievements.

A legitimacy for an internationally coordinated framework curriculum for a Master's degree in TVET was derived from current global developments. Global economic competition increases the demand for high-quality products. High-quality products and high-quality, value-added work are at the core of global economic success in the 21st century.

a. Standards and requirements

The development of competences of vocational schoolteachers is closely linked to their respective fields of study, which are differentiated along the vocational specializations. A central point is that vocational schoolteachers need a "double subject reference" [39, 40], a reference to the occupations of a vocational field as a subject and a reference to the corresponding vocational discipline. This double reference is essential both for teacher education (development of professional and subject didactic competences) and for later teaching work (content and methodological design of learning as typical teacher tasks).

Often, the quality of teaching is determined by learning outcomes and associated competence by measuring how well learners perform on exams. Crucially, however, different levels and parameters of a TVET system influence outcomes. TVET systems are networks of interdependent system areas, and three factors, in addition to the framework conditions, are key determinants of quality: Teachers, learners and the learning content. In addition, the framework should provide appropriate space for learning, such as a legal framework, rooms, equipment, and media. But teachers are the essential actors who bring the framework together with the content and the learners. Therefore, a TVET teacher profile needs to be defined in a way that clarifies what TVET teachers need to be able to do in order to produce "quality."

Oddly enough, most quality assurance systems for vocational education focus on frameworks and on issues such as certification and assessment. This focus can also be seen in the description of standards for teachers [41, 38]. It is important to emphasize that standards for TVET teachers should focus on the three main factors mentioned above: teachers, learners, and learning content, with the teacher at the center.

Based on UNESCO and an ILO international working paper [20], eight parameters have been identified that frame the development processes of societies. One of these processes is

> "Professionalization of teachers and trainers in vocational education and training."

Improving the competence of skilled workers with the help of vocational training is the core of this parameter. The relevance of this objective is illustrated by an analysis of the deficits in the education and training of teachers and trainers. With the help of a reform catalog based on a publication of the International Labor Organization [20], four pillars for quality improvement in the training of teachers and trainers can be identified. The aim here is to develop a coherent, inclusive, and high-quality system for the training of teaching staff:

- Pillar one: "Structure and relevance"
- Pillar two: "Responsiveness and inclusiveness"
- Pillar three: "Innovation and progress"
- Pillar four: "Representation and communication."

Pillars one and three are aimed at achieving employability, primarily work process-based curricula are developed to tie in with this. One of the key points of the ILO paper

is to demonstrate that TVET teaching staff must have both technical and vocational knowledge as well as vocational pedagogical skills to meet the multiple demands. The key message of the four pillars is that TVET teacher education programs (pre-service and in-service) must provide strong subject-based knowledge and achieve the highest possible standards of teaching performance. Finally, students must be prepared for employment in specific occupations or professional fields. The main tasks/areas for teachers are [35, 42]:

Teaching and communication

- teaching vocational pedagogy and didactics,
- teaching in vocational specialties,
- professional communication (with all target groups),
- lecturing and leading discussions to enhance students' knowledge and competences in the professional context,
- instructing and supervising trainees in the use of tools, equipment and materials and preventing injury and damage,
- providing individualized instruction and tutoring or remedial instruction,
- conducting on-the-job training to teach and demonstrate principles, techniques, procedures, or methods on specific topics,

Management of teaching

- management in the context of professional tasks and administration, counseling, vocational guidance,
- preparing reports and maintaining records such as student grades, attendance, and details of educational activities,
- supervizing independent or group projects, field placements, laboratory work, or other training,

Planning of teaching

- developing curricula/syllabi,
- planning course content, teaching methods and instruction,

Needs identification

- identifying students' training needs and liaising with individuals, industry and other educational sectors to ensure the provision of relevant education and training programs,

Evaluation and assessment

- observing and evaluating student work to determine progress, providing feedback, and making suggestions for improvement,
- conducting oral or written performance tests to measure progress, evaluating effectiveness of training, and assessing competence.

The description of the areas of work for teachers is consistent with the requirements and notion of a teacher with an "integrated profile". Such a job description assumes a discipline-oriented profiling that is neither solely pedagogical nor subject-specific. Teaching and educating, planning, evaluating and assessing as well as supporting innovations are core competences of the work of teachers with simultaneous reference to vocational pedagogy, vocational didactics and vocational disciplines. The standards for teachers in vocational education must take these areas into account. This will be discussed further after the considerations on "vocational specializations" and the details of a "teacher profile".

b. Professional specialties as a discipline

The following definition is intended to help clarifying the term "professional discipline." It will be used as a basis for further discussion.

Formal:

- Area that must be studied by future teaching staff in order to develop relevant teaching competences for teaching occupation-related subjects in a specific occupational field [43].

At the same time:

- Scientific subject to clarify the theory of occupations / occupational competences and teaching content.

The term vocational discipline is usually used in the field of vocational education to indicate the specific learning area and the associated learning requirements for the world of work. Due to the close link between vocational subject and vocational didactics as parts of a vocational discipline, the term "vocational subject and its didactics" is usually used. For a more in-depth discussion of the (not only internationally) inconsistent understanding, see the comments in Zhao & Rauner [44].

A clarification of the term vocational specialization is a central requirement in the formulation of standards, without which neither a clarification of the orientation of teacher education nor of the content and structures necessary for this is possible. With the help of the clarifications already brought about, also internationally, the following definition is used as a basis for the formulation of teacher standards:

A vocational specialization is:

- The area to be taught in vocational education/teacher education specialization.
- A theory of the professions for university requirements and questions (research) [45] which is associated with professional domains / occupations in a professional field. The Hangzhou Declaration [19] includes a catalogue of twelve occupational disciplines that represent the occupational domains in which vocational education takes place.
- A scientifically based "vocational subject," and in this sense, a combination of vocational science (which identifies the content of vocational knowledge and skills for mastering work processes and work tasks in an occupation/vocational

domain [46]; and vocational didactics (which answers the question of relevant content and methods for teaching).
- It is subdivided into four relevant areas of responsibility for teachers, which are characterized by the analysis, design, and evaluation of
  - occupations in a vocational field,
  - vocational learning, education and qualification processes,
  - occupational work and business processes,
  - technology as an object of work and learning processes in their historical development, current manifestations, and future prospects [36].

For the vocational disciplines, UNEVOC [19] defines 12 disciplines, which are listed below:
- Business and Administration,
- Production and Manufacturing,
- Civil Engineering,
- Electrical and Electronic Engineering,
- Information and Communications Technology,
- Process Engineering and Energy,
- Health and Social Care,
- Education and Culture,
- Leisure, Travel and Tourism, Agriculture, Food, and Nutrition,
- Media and Information,
- Textiles and Design,
- Mining and Natural Resources.

"Automotive Technology/Automotive" is integrated into "Production and Manufacturing" in this recommendation. Due to the importance of the automotive field, the recommendation is to include this discipline as a separate specialty. Information and Communication Technology should also be listed as a separate discipline.

6.2 Results: Structure of standards for teacher education.

The clarifications presented show how international developments and findings on teacher qualification can be taken up and provided with a vocational-technical discipline orientation. The result of the above explanations is in essence that teachers in vocational education need a close link between different areas of competence. On the one hand, they need vocational competences (related to a vocational discipline), on the other hand, personal, social and work process-related as well as pedagogical and especially methodological-didactic competences on a scientifically reflected level. At all levels, due to technological and social developments, the reflection and development of competences related to digitalization and sustainability and an examination of green professions must be included [47].

The development of these competences and, of course, the empowerment of teachers to fulfil them as part of their tasks requires a combination and a relation be-

tween all the mentioned competence areas and especially between the dimensions "vocational pedagogy" and the vocational discipline as "subject". In general education, the subject of teaching is defined by means of general scientific disciplines such as biology for biology teachers or technology for technology teachers. In contrast, the subject of vocational education teachers is one with "dual subject reference" (see above), meaning that vocational disciplines and reference occupations define the subject matter.

The pedagogical dimension (Figure 4, [47]) in vocational education should be understood as a bridge between the areas of responsibility for identifying, preparing and performing work (based on vocational work tasks) and the learning content and processes. This bridge (supported by the term "vocational") ensures vocational teaching and learning and makes it clear that teaching is sometimes fundamentally different from teaching in general subjects. The special significance of vocational learning processes in this context lies in securing a vocational ability to act that supports learners in the world of work.

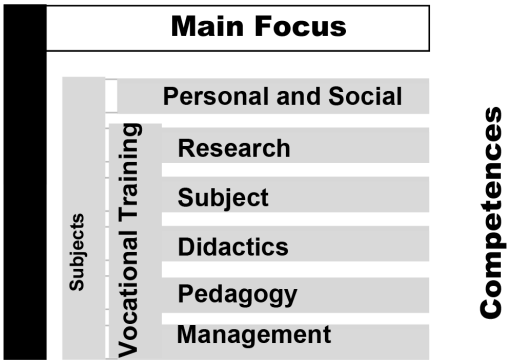


Figure 4: Areas of competence for standards for teachers in vocational training

In further consideration, it is a challenge to differentiate between the competence areas and at the same time to combine and integrate them into one standard. Since competences are not separate in reality, but are identifiable as outcomes in the sense of achievements (occupational performance) in the context of tasks, the standards are described as competences for teachers. These outcome-based standards complete the expected outputs and recommendations for process and input (cf. Table 2).

The standards consist of two holistic competence areas, which are described as tasks for teachers in vocational education [47]:

1. Personal and social competences, describe the competences of a vocational education teacher who identifies with the vocational school as an institution, including the underlying system. This includes personal attitudes to engage in continuous development of one's own skills and competences.
2. Vocational research, subject, didactics, pedagogical, and management competences, describe competences for identifying, preparing, and delivering instruction focused on occupations in the vocational field and based on competences in a vocational specialty (see overview below for details).

This second item consists of several categories or prioritizations:

a) Occupational (educational) research: competences of vocational education teachers to identify occupational competence requirements, developments in occupations, and instructional requirements.
b) Vocational specialization: competences of vocational education teachers to analyze the vocational field (manufacturing, automotive engineering) and the associated requirements and changes in the world of work.
c) Vocational didactics: competences of vocational education teachers to select and structure relevant content and methods to support vocational learning processes.
d) Vocational pedagogy: competences of teachers for planning, implementing and evaluating learning units.
e) Vocational management: competences of teachers for organizing and developing vocational schools and vocational education programs.

Each of the designated categories is reaching out to adjacent categories. Therefore, vocational teachers' competences can be named and each can be located between two categories. Assignments can be recognized by their proximity to the respective category [47].

Table 2: Competences of TVET teachers

Vocational (educational) research	Determine professional competence requirements	Derivation of the respective learning needs and training requirements	*Professional specialization*
Professional specialization	Analyze technology and its importance for learning in the context of organization, methods, tools, equipment, and materials in the work environment.	Analyze technological needs and the changing nature of work and develop strategies or approaches for learning in a variety of learning environments	*Professional didactics*
	Developing vocational education curricula at school level and participating in curriculum development at the national level.	Analyze didactic approaches and evaluate their use for learning in the context of digital technologies and changes in work and work organization.	
Professional didactics	Design of learning units by using innovative teaching methods with which the complexity of the (subject) work can be opened up.	Develop school-based curricula, syllabi, and learning materials for use in innovative instruction	*Vocational Pedagogy*
	Planning of theoretical and practical lessons in classrooms and workshops	Implementation of learning units to support the competence development of the learners	
		Conduct assessments and evaluations of learners' professional competences.	

(Continuing table 2)

Vocational Pedagogy	Accompanying the competence development of the students, taking into account the level of competence development, the living environment and the individual learning conditions.	Shaping the learning and school culture and further developing the school environment, taking into account the promotion of lifelong learning	*Vocational Management*
	Improvement of learning and interaction processes through selection and development of appropriate methods the living environment and individual learning conditions	Shaping the learning and school culture and further developing the school environment, taking into account the promotion of lifelong learning	
	Improvement of learning and interaction processes through selection and development of appropriate methods	Design and organize learning and working environments	

Table 2 thus points out that there is a field of tension between the specific tasks that teachers have to fulfil in TVET and the general theoretical demands on teacher training. In order to resolve this tension, the two columns on the central topics (subjects) of TVET on the one hand formulate requirements – better defined – and on the other hand refer to how these are to be fulfilled. In these two perspectives, the focus is on the reference to TVET and it is made clear how the tension can be resolved for each individual subject.

7 Conclusions

The explanations show that, for example, the ILO and UNESCO are considering a wide variety of ways to professionalize the training of teachers for vocational education systems. Standards play a role in this, but are not specified and concretized sufficiently, so that the instruments cannot be used directly for quality development and quality assurance. The dimensions that play an important role in quality development in particular are discussed in the last part of the article, and their interrelationships are clarified. The subject-oriented dimension of the professional disciplines is of particular importance. Of greater interest might be the usability of such approaches for the design of standards on the one hand and for the design of teachers' work in school-based as well as in-company vocational training institutions on the other hand. However, it is too short-sighted to formulate standards without clarifying the fundamental level of teacher training.

The diverse requirements and tasks of teachers in vocational education and training outlined in the article clearly point to the fact that a university education is justified as an objective and then, when it comes to a complete education, a Master Degree should be made possible as a degree. Only this level guarantees a teacher profile that is prepared for the wide range of tasks and prepares the persons in question to cope with these tasks.

Such a degree program must also introduce students to research in order to enable the target group to deal with simpler research questions that are relevant to everyday professional life.

In the article, a concept for the definition of standards was developed based on the tasks of TVET. Both, the tasks mentioned and the standards, have to be secured for each country through TVET-oriented research. Because TVET is usually closely linked to the labor market and thus to the needs of industry, it must first be clarified which training models for teachers are to be pursued in the respective country. One of the fundamental questions is whether TVET teachers should be generalists or specialists, i. e. whether they should teach very general technical questions in the field of technology, for example, or discipline- or sector-related. In the article, a sectoral approach was assumed based on the Hangzhou Declaration (cf. [19]. The reason for this is that TVET graduates have to be experts in their fields of application (e. g. automotive engineering) and therefore an expertise in a selected field has to be developed.

A second question to be clarified before developing the standards is whether TVET teachers should be trained at university level (Bachelor or Master Degree).

Both questions have to be decided depending on a country's level of development in TVET and the educational policy goals pursued. Once both questions have been clarified, the development of standards can be initiated.

References

[1] ILO-UNESCO (Eds.). (2012). *Transforming TVET: Building skills for work and life (Shanghai Consensus): Recommendations of the Third International Congress on Technical and Vocational Education and Training*. Paris: UNESCO. Retrieved from https://unevoc.unesco.org/home/Report:+Building+Skills+for+Work+and+Life,+Shanghai,+China,+13-16+May+2012:+Third+International+Congress+on+TVET&context=

[2] Hattie, J. (2008). Visible learning: *A synthesis of over 800 meta-analyses relating to achievement*. routledge.

[3] Meyer, R. (2023). Professionelle Handlungskompetenz von beruflichem Bildungspersonal. In *Lernen und lehren : Elektrotechnik, Informationstechnik, Metalltechnik, Fahrzeugtechnik, 38 (2023), H. 151*, pp. 92–99.

[4] Tegelbeckers, H., Schüssler, P., Vieback, L., & Brämer, S. (2019). Teaching technology in early education as a pathway to future mechanical engineers. In *X Conferencia Científica Internacional de Ingeniería Mecánica*. COMEC (Vol. 10). Concención Científica Internacional UCLV.

[5] International Bank for Reconstruction and Development, The World Bank, UNESCO, & International Labour Organization (Eds.). (2023). *Building better formal TVET systems: Principles and practice in low- and middle-income countries*. World Bank Publications.

[6] Volmari, K., Helakorpi, S., & Frimodt, R. (2009). *Competence framework for VET professions. Handbook for practitioners*. Helsinki: Finnish National Board of Education.

[7] Council of the European Union. (2020). *Council conclusions on European teachers and trainers for the future*. Official Journal of the European Union, C 193/04, 11 ff. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=uriserv%3AOJ.C_.2020.193.01.0011.01.ENG

[8] Bortz, J., & Döring, N. (2002). *Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler* (3rd edition). Springer.

[9] Bünning, F., Spöttl, G., & Stolte, H. (2022) (Eds.), Technical and Vocational Teacher Education and Training. In *International and Development Co-Operation: Models, Approaches and Trends* (Vol. 34). Springer Nature.

[10] Euler, D. (2018). TVET Personnel in ASEAN: investigation in five ASEAN states. Eusl.

[11] Mayring, P. (2016). Einführung in die qualitative Sozialforschung. Beltz.

[12] Việt, N. Q., & Chi, N. T. K. (2022). *Training and Professional Development for VET Teachers in Vietnam*. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 147–166). Springer Nature Singapore.

[13] Chrea, S., & Yok, S. (2022). Pre-service TVET teacher education in Cambodia. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 231–241). Springer Nature Singapore.

[14] Vodita, O., Ionascu-Cuciuc, E., & Hincu, L. (2022). Education and Training of Vocational Education and Training (VET): Teachers in the Republic of Moldova. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 309–318). Springer Nature Singapore.

[15] Bünning, F. (2022). Models of TVET Teacher Education in Germany and their Potential to Meet Growing Demands in TVET Teacher Education. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 479–491). Springer Nature Singapore.

[16] MoER (2018). Regulation for the attestation of teachers in general, technical and vocational education and psycho-pedagogical assistance services. The order of the MoER, No.62. https://mecc.gov.md/sites/default/files/regulament_atestare.pdf.

[17] VET (2013). Technical vocational education development strategy for the years 2013–2020. Government Decision, No. 97: Mongolia. http://lex.justice.md/md/346695/.

[18] Thierack, A. (2004). Lehramtsspezifische BA-MA-Studienkonzepte–offene Fragen für die Erziehungswissenschaften im Lehramt. *Vorversion des im Auftrag des BMBF erstellten Berichts*, vom März.

[19] UNESCO-UNEVOC (Ed.) (2004). UNESCO International Meeting on Innovation and Excellence in TVET Teacher/Trainer Education. Documentation. UNESCO-UNEVOC : Hangzhou 2004. https://unevoc.unesco.org/fileadmin/user_upload/pubs/Hangzhou_International_framework.pdf.

[20] Axmann, M., Rhoades, A., Nordstrum, L. E., La Rue, J. A., & Byusa, M. (2015). *Vocational teachers and trainers in a changing world: the imperative of high-quality teacher training systems* (No. 994879203402676). International Labour Organization.

[21] UNESCO (Eds.) (2016a). Recommendation concerning technical and vocational education and training (TVET). UNESCO : Paris. https://unesdoc.unesco.org/ark:/48223/pf0000245178.

[22] UN (Eds.) (2015). United Nations Summit on Sustainable Development 2015. Informal summary. 25–27 September. UN: New York. https://sustainabledevelopment.un.org/content/documents/8521Informal%20Summary%20-%20UN%20Summit%20on%20Sustainable%20Development%202015.pdf
[23] UNESCO-UNEVOC (Eds.) (2020). Future of TVET Teacher. UNESCO-UNEVOC Study. Education 2030. UNESCO-UNEVOC: Bonn. https://www.skillreporter.com/wp-content/uploads/2020/08/Future-of-TVET-Teaching-Pooja-Gianchandani-Gita-Subrahmanyam-UNESCO-UNEVOC-Report-Skill-Development.pdf.
[24] UNESCO (Eds.) (2016b). Teachers in the Asia-Pacific: career progression and professional development. UNESCO : Paris. https://unesdoc.unesco.org/ark:/48223/pf0000246011.
[25] Dittrich, J., Yunos, J. M., Spoettl, G., & Bukit, M. (2012). *Standardisation in TVET teacher education*. Peter Lang GmbH, Internationaler Verlag der Wissenschaften.
[26] Marope, P. T. M., Chakroun, B., & Holmes, K. P. (2015). *Unleashing the potential: Transforming technical and vocational education and training*. UNESCO Publishing.
[27] Rawkins, C. (2018). A Global Overview of TVET Teaching and Training: Current Issues, Trends and Recommendations. Joint ILO-UNESCO Committee of Experts on the Application of the Recommendations concerning Teaching Personnel (CEART). CEART: Paris, Geneva.
[28] OECD (2021). Teachers and Leaders in Vocational Education and Training. OECD Reviews of Vocational Education and Training. OECD Publishing: Paris, https://doi.org/10.1787/59d4fbb1-en.
[29] Hartmann, M. (2022). Lehrer:innenbildung. Implikationen veränderter Arbeitsrealitäten für die zukünftige Gestaltung der Lehrerbildung. In: Anselmann, S.; Faßhauer, U.; Nepper, H. H. & Windelband, L. (Eds.), *Berufliche Arbeit und Berufsbildung zwischen Kontinuität und Innovation*. (pp. 167–175). wbv Media.
[30] UNESCO (Eds.) (2014). Technical and Vocational Teachers and Trainers in the Arab Region. A Review of Policies and Practices on Continuous Professional Development. UNESCO: Paris. URL: https://unesdoc.unesco.org/ark:/48223/pf0000231160
[31] Spöttl, G., & Stolte, H. (2022). TVET Teacher Profile and Standards for a Master's Degree Programme. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 9–31). Springer Nature Singapore.
[32] Hassan, R., & bin Ismail, A. (2022). The Development of Malaysia TVET Teacher Training (TT-TVET). In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 255–275). Springer Nature Singapore.
[33] Panth, B., Kreibich, L. M., Borjegren, P., & Chong, F. Y. (2022). Perspectives of ADB on the Education and Training of TVET Teachers. In *Technical and Vocational Teacher Education and Training in International and Development Co-Operation: Models, Approaches and Trends* (pp. 53–65). Springer Nature Singapore.

[34] Comyn, P. (2022). TVET Teacher Education and Training in International and Development. In: Bünning, F., Spöttl, G. & Stolte, H. (Eds.), *Technical and Vocational Teacher Education and Training in International and Development Co-Operation – Models, Approaches and Trends*. (pp. 83–94). Springer.
[35] ILO (2012). International Standard Classification of Occupations. Structure, group definitions and correspondence tables. International Labour Office: Geneva.
[36] gtw (2010). Empfehlungen zur Ausgestaltung von Studienordnungen für Bachelor- und Masterstudiengänge gewerblich-technischer Fachrichtungen. Berufliche Fachrichtung Metalltechnik. Januar 2010. Online: https://www.gtw-ag.de/download/772/.
[37] Gruber, H., & Harteis, C. (2018). *Individual and social influences on professional learning: Supporting the acquisition and maintenance of expertise* (Vol. 24). Springer.
[38] Spöttl, G., Tahir, R. (2019). *Quality Toolbox for better TVET delivery. Practical instruments for TVET and mangers*. RECOTVET Programme. GIZ: Hanoi, Vietnam. Bonn, Eschborn.
[39] Spöttl, G. (2014, November). Teacher Training in TVET A Structural Dilemma and the Role of Standards. In *4th World Congress on TVET* (pp. 530–536).
[40] KMK (2019) – Kultusministerkonferenz (Hrsg.): Ländergemeinsame inhaltliche Anforderungen für die Fachwissenschaften und Fachdidaktiken in der Lehrerbildung. Beschluss der Kultusministerkonferenz vom 16.10.2008 i. d. F. vom 16.05.2019. KMK: Berlin URL: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2008/2008_10_16-Fachprofile-Lehrerbildung.pdf.
[41] UNESCO (Eds.) (2017). Guidelines for the Quality Assurance of TVET Qualifications in the Asia-Pacific Region. UNESCO: Bangkok.
[42] ISCO-08: Internationale Standardklassifikation der Berufe. https://www.ilo.org/public/english/bureau/stat/isco/isco08/.
[43] Pahl, J. P., & Herkner, V. (1949). (Eds.), *Handbuch Berufliche Fachrichtungen*. wbv Media GmbH & Company KG.
[44] Rauner, F., & Zhao, Z. (2014). TVET-Research: An Introduction. In *Areas of Vocational Education Research* (pp. 1–15). Springer Berlin Heidelberg.
[45] Pahl, J. P. (2014). Vocational education research: Research on vocational pedagogy, vocational discipline and vocational didactics. In *Areas of vocational education research* (pp. 17–43). Springer Berlin Heidelberg.
[46] Becker, M., Spöttl, G., & Windelband, L. (2019). Berufliche Fachdidaktiken/Berufsdidaktik im Spannungsfeld der Berufspädagogik und der gewerblich-technischen Fachrichtungen. bwp@ Berufs-und Wirtschaftspädagogik–online, Ausgabe, 37, 1–21.
[47] Becker, M., & Spöttl, G. (2022). Standards für die Lehrer: innenbildung–ein transnationales Referenzkonzept. *Berufliche Arbeit und Berufsbildung zwischen Kontinuität und Innovation: Konferenzband zur 21. Tagung der Gewerblichen-Technischen Wissenschaften und ihren Didaktiken* (GTW), 64, 23.

All Homepages accessed on May 29, 2024

Advancing PhD Programs in Vocational Education Across Kazakhstan, Uzbekistan, Pakistan, and India

Y. O. Nepomyashcha, L. Lockau, M. Kanwal, Daljeet Kaur

The VoCasian project, conducted by OvGU in collaboration with TSU, aimed to professionalize vocational education in Georgia [1]. The main goal was to jointly develop a PhD program in vocational education to enhance its visibility, initiate research, and improve vocational teacher training. Additionally, a graduate school was introduced to promote research, continuing education, and networking. The accredited PhD program for Georgian vocational education personnel builds sustainable vocational education research capacities, offering transferable insights and strategies for other countries. The potential of this vocational education partnership can be effectively enhanced through the active involvement of cooperation partners from Central and South Asia. The sustainable follow-up capability of VoCasian is particularly based on OvGU's multi-year experience with Kazakh universities and colleges in subsequent vocational education projects GeKaVoc – Transfer of dual training programs in logistics, mechatronics, and sustainable energy supply to Kazakhstan [2] and KazDual – Implementing dual system in Kazakhstan [3]. This fruitful cooperation can be extended in the Central Asian region by collaborating in Uzbekistan.

In light of the future tasks of vocational education and the existing or to-be-developed capacities in Pakistan and India, the prospects for South Asian graduates of the ITVET master program – International technical and vocational education and training continuing education program are considered promising. This contribution discusses the implementation and transfer opportunities for PhD programmes in these countries.

1 Establishment of PhD doctoral studies in the field of vocational education in Kazakhstan

1.1 Introduction

Kazakhstan is actively modernizing its vocational education system to better prepare its workforce and meet the evolving demands of the labor market.

Amidst the ongoing reforms in Kazakhstan's education sector, there is a growing recognition of the need for specialized doctoral programs in vocational education to address critical gaps in research and expertise.

The introduction of doctoral programs in vocational education offers the opportunity to significantly enhance Kazakhstan's research capacities and produce highly qualified professionals who are equipped for the challenges of vocational education.

Based on the recognition of Kazakhstan's efforts to modernize the vocational education system and the recognition of the need for specialized doctoral programs, the dual system in Kazakhstan is discussed below.

1.2 Reform of the dual System in Kazakhstan

Kazakhstan is actively reforming its vocational education system to improve the quality of training and meet labor market demands. Within the recently completed KazDual project, Kazakhstan is establishing a dual vocational education and training system based on German and Austrian models, supported by the Kazakh Accreditation Agency and the Ministry of Education. A significant project outcome is the establishment of an observatory for best practices in vocational education.

However, there is a lack of research specialists in vocational education, attributed to the absence of doctoral programs in this field. Kazakhstan is introducing new educational standards that incorporate international practices and collaborates closely with international educational institutions. Reforms include curriculum revisions, modern teaching methods, and enhanced cooperation with businesses. Additionally, Kazakhstan's policy promotes research activities in universities through the creation of modern research centers. The reforms aim for closer collaboration between educational institutions and businesses, the creation of specialized programs, workplace training, and course updates aligned with employer requirements.

Laws have regulated vocational education since 2007 [4], particularly the Educational Development Program 2020–2025 [5] and the latest state standards of 2022 (Order of the Minister of Education of the Republic of Kazakhstan dated 3 August 2022 No. 348. Registered with the Ministry of Justice of the Republic of Kazakhstan on 5 August 2022 No. 29031) [6] and 2023 ("On professional qualifications" The Law of the Republic of Kazakhstan dated July 4, 2023 No. 14-VIII.) [7]. These laws ensure quality standards, adapt training to the labor market, and integrate modern methods. The industrial development program 2020–2025 (Resolution of the Government of the Republic of Kazakhstan dated 31 December 2019 No. 1050) [8] and the strategic development plan until 2025 (Decree of the President of the Republic of Kazakhstan dated 15 February 2018 No. 636) [9] emphasize functional literacy, modern skills, and the competitiveness of education.

Despite positive developments, challenges such as bureaucratic hurdles and access to education for all social groups remain. One problem is the gap between theoretical training and practical skills. In the past decade, Kazakhstan has introduced practice-oriented educational programs to bridge this gap. Continuous labor market monitoring and industry research remain crucial.

1.3 PhD Needs in Kazakhstan

Kazakhstan has undertaken significant reforms in the education sector in recent years to improve the quality and relevance of education. Vocational education is a crucial component of these efforts, especially in light of the country's economic diversification goals.

Kazakhstan has a dual vocational education system that combines theoretical training at vocational schools with practical training in companies. This system, modeled on the German approach, aims to enhance graduates' employability. Vocational education is offered by a variety of institutions, including technical and vocational colleges as well as specialized universities.

The demand for highly qualified professionals, including those with doctorates in vocational education, has increased. However, there are still few programs specifically targeting doctoral studies (NQF Level 8) in vocational education.

Some of the key higher education institutions in Kazakhstan that focus on vocational education are:

- Abai Kazakh National Pedagogical University: This university offers programs aimed at training teachers for vocational education [10].
- Satbayev Kazakh National Technical University: This university is a leader in technical and engineering programs closely linked with vocational education [11].
- L.N. Gumilyov Eurasian National University: Also offers programs with a focus on educational sciences and vocational education [12].

However, some universities offer doctoral programs in educational sciences that can cover aspects of vocational education. The introduction of specialized PhD programs in vocational education could help strengthen research capacities and develop highly qualified professionals capable of finding innovative solutions to the challenges in the vocational education system.

Research on vocational education in Kazakhstan is still developing. According to the reports of the Kazakh partners, the number of studies on the results and effectiveness of vocational education is growing within the framework of the KazDual project, but there is still a need for more in-depth, systematic research. Existing research primarily focuses on the adaptation of the dual system, quality assurance, and the integration of new technologies and methods into vocational education [13, 14, 15].

1.4 Prospects for the Introduction of PhD Programs in Vocational Education

The experts at Abai Kazakh National Pedagogical University consider that PhD programs in Kazakhstan should be interdisciplinary and focus on research in the field of technical vocational education and training (TVET). These programs need to address changes in labor market structure and required professional competencies due to global transformations, social policy shifts, and economic priorities in Kazakhstan. Specific PhD programs would deepen research in the field of vocational education and bring forth new insights.

The research outcomes will positively impact regional development and workforce balance. Highly qualified teachers and researchers could contribute to improving the quality of education and developing innovative educational approaches. Graduates must acquire competencies in digital technology, artificial intelligence, technological know-how for industrial services, market promotion, labor market analysis, and new skill forecasting. The program structure will include professional higher education

pedagogy, labor market studies, regional planning, economic analysis, social and education policy, ICT, research methodology, vocational diagnostics, and statistical methods. These elements will align the education system with labor market needs and promote collaboration with regional and European universities. A structured PhD pathway would help Kazakhstan align with international standards and promote the recognition of Kazakhstani degrees.

Partnerships with local industries, authorities, and organizations such as chambers of commerce and trade unions are crucial. This ensures the alignment of research and training with actual labor market needs and contributes to regional education, social policy and decision-making processes. An increased emphasis on vocational education at the doctoral level could stimulate political support and investment in this area.

The PhD programs will support advanced regional research centers in TVET, contributing to labor market forecasting, defining qualification requirements, training new professionals, developing regional standards, and incorporating European training practices. The result will be relevant, high-quality PhD programs tailored to the economic sector, ensuring graduates' employment.

1.5 Key findings from PhD Future in Kazakhstan

The need for PhD programs in vocational education in Kazakhstan is evident given the economic goals and the necessity for a highly skilled workforce. The introduction of such programs could enhance existing structures and significantly strengthen research in the field of vocational education. This would lead to better alignment of the education system with the demands of the labor market in the long term.

The results of the VoCasian project offer valuable insights and strategies for sustainable vocational education research, including the development and implementation of vocational education-related PhD programs and support during doctoral studies in Kazakhstan.

2 Development of PhD in Vocational Education in Uzbekistan

2.1 Introduction

Since the appointment of Shavkat Mirziyoyev as President in 2016, Uzbekistan has embarked on a comprehensive transformation process aimed at modernizing various sectors, including education. This effort is part of a broader strategy to improve the nation's positioning on the international stage and to enhance the quality of research and teaching within its higher education system.

The implementation of TVET into existing doctoral programs is an essential part of the educational reform development process in Uzbekistan. However, the development of PhD programs that focus exclusively on TVET is still pending.

2.2 Comprehensive reforms in Uzbekistan and their impact on vocational education and training

Uzbekistan has been undergoing a comprehensive transformation process since 2017. The appointment of Shavkat Mirziyoyev as President of the country in September 2016 was followed by a series of reforms, some of which continue to this day. These changes are noticeable in many areas of society, such as monetary and economic policy, foreign policy, but also in infrastructure and education. In this sense, Uzbekistan not only wants to expand and improve its relations with international organizations, but is also increasingly opening up to international cooperation in the field of higher education. Uzbekistan is seeking cooperation with international experts and institutions in order to modernize its higher education system. The aim is to improve the positioning of Uzbek universities on the international stage and, above all, the quality of research and teaching [16].

The reforms also aim to improve vocational education and professional training in Uzbekistan, with a particular focus on higher education. In this context, the Uzbek government has passed a large number of laws that contribute to shaping policy in the country's vocational education and training sector. The enactment of these new laws illustrates the Uzbek government's forward-looking strategy, which is primarily focused on developing a skilled and competitive workforce. Particular attention is paid to the following aspects:

High-quality education: presidential decree PQ-3775 (05.06.2018) [17] promotes the improvement of the quality of education at higher education institutions. It also aims to ensure that higher education institutions develop their own training plans and programs based on the needs of the labour market.

Orientation towards the requirements of the labor market: decree PQ-5241 (31.08.2021) [18] aims to strengthen the practical training of students and the relevance of educational programs to the needs of the market. This includes drawing up an annual list of the most sought-after professions and positions, improving cooperation between educational institutions and the labor market and promoting the teacher-student system for better practical training and supervision.

Gender equality: the PQ-323 (18.07.2022) [19] decree promotes the support of women's education in higher, secondary specialized, and vocational education institutions. It provides for the creation of a financing mechanism for educational loans specifically for women.

Practical training: the Law of Education (enacted on 23.09.2020) [20] places the focus on primary vocational education and training in vocational schools, secondary vocational education and training in colleges and secondary specialized vocational education and training in technical colleges.

In a 5-year Education Sector Plan (ESP), the Uzbek government has set a number of political goals for TVET for the period between 2019 and 2023 ESP of Uzbekistan 2019–2023. These objectives are focused on the following strategic areas: *Access and participation, Safe and enabling learning environments, Curriculum and Assessment, Teaching Learning Materials and use of Technology, Faculity and professional development* [21].

2.3 The vocational training system in Uzbekistan

Since the 2021/2022 school year, dual training has been introduced for all levels of vocational education and training (Ordinance on Measures for the Organization of Dual Training) [22].

According to the Uzbek education law, vocational training can be divided into three areas. The *basic vocational education* is provided in vocational schools on the basis of two-year integrated teaching programs with general education subjects and vocational subjects. For admission, students need to have completed the 9th grade. If students do not wish to pursue vocational training, they can also attend a general secondary school or an Academic Lyzeum after the 9th grade. The successful completion of a general education school (11th grade), an Academic Lyzeum or a basic professional education qualifies for the area of *intermediate vocational training*. Intermediate vocational training can be completed after up to 2 years (depending on the complexity of the specialization) with the intermediate vocational training diploma and is acquired at colleges. The alternative to intermediate vocational education and training is secondary vocational education. Here too, the entry requirements are the completion of a general secondary school (11th grade), an academic lyceum, basic vocational training or intermediate vocational training. The intermediate vocational education programs are integrated into the educational programs of the corresponding areas of the higher education institutions. At the end of the intermediate vocational education, the diploma of secondary vocational education is awarded [22]. The secondary vocational education takes place within the framework of the so-called "Technikum" (technical school).

2.4 Necessity of implementing the VoCasion project in Uzbekistan

As we have seen in the previous chapters, Uzbekistan is undergoing a comprehensive development process, which is also evident in the area of vocational education and training. Accordingly the country has taken many steps to professionalise the area of TVET. The VoCasian project in Uzbekistan can play a supporting role here.

One weakness in the TVET education system in Uzbekistan is the lack of connection between the content of the educational programs and the needs of the real sector. In general, there is insufficient cooperation between the labor market and professional education. As a result, students acquire fewer of the skills and highly qualified training required for the labor market [23].

The VoCasian project is intended to help improve connectivity to an international labor market. In times of globalization, it is necessary to meet international quality standards. It would be beneficial for Uzbekistan if the qualifications acquired locally were also accepted in the education systems of other countries [24].

The introduction of further PhD programs in the field of vocational education and training, which are currently still lacking, could be very helpful in this regard.

There are several universities in Uzbekistan that offer PhD programs in various fields, including TVET [25, 26]. However, the availability of special PhD programs that focus exclusively on vocational education is limited.

A major problem in the Uzbek higher education system in general is the lack of quality of graduates' academic knowledge and skills. According to the *Deutscher Akademischer Austauschdienst (DAAD)*, the level of degrees (Master and Bachelor) in Uzbekistan, for example, is noticeably lower than those awarded at German universities [16]. By implementing the VoCasian project, the qualification of vocational teachers in Uzbekistan would be systematically supported and researched.

2.5 Central insights into PhD development in Uzbekistan

Developing PhD programs in vocational education is vital for Uzbekistan's educational and economic reforms. Since President Shavkat Mirziyoyev's appointment in 2016, the country has modernized various sectors, including education, aiming to enhance international relations and improve higher education quality with a focus on vocational training.

Since 2017, Uzbekistan has implemented numerous reforms in areas like monetary policy, foreign relations, infrastructure, and education. These reforms, supported by international cooperation and legislation, emphasize high-quality education, labor market alignment, gender equality, and practical training. The 5-year Education Sector Plan (2019–2023) sets strategic goals for technical and vocational education and training (TVET).

The vocational training system, reformed in 2021/2022 to include dual training, has three levels: basic vocational education in vocational schools, intermediate vocational training in colleges, and specialized vocational training in technical schools. Each level integrates general and vocational subjects, awarding diplomas upon completion.

Challenges such as insufficient alignment with labor market needs and inadequate cooperation between education and industry persist. While some PhD programs exist, specialized PhD programs in vocational education are limited. Enhancing academic programs and vocational teacher qualifications through initiatives like VoCasian is crucial for advancing Uzbekistan's educational system.

3 Mainstreaming TVET in Higher Education Sector in Pakistan-Ph.D. Prospects

3.1 Introduction

In Pakistan, a large number of youth enter the job market each year, but there are far fewer training spots available in TVET institutions, highlighting a significant supply-demand gap. Additionally, TVET training often does not meet labor market needs, necessitating comprehensive reforms.

The Government of Pakistan implemented comprehensive TVET reforms from 2011 to 2022, achieving milestones such as a national TVET – Technical and Vocational Education and Training policy, the NVQF – National Vocational Qualification Framework, CBT&A (Competency Based Training & Assessment), improved governance,

and greater private sector involvement. However, these reforms did not integrate higher education initiatives like doctoral or research-based master's programs in TVET.

Phase III of TVET reforms, supported by Germany, focuses on green skills, digitization, and gender inclusion but still neglects higher education perspectives. This section critically analyzes the TVET mission, policies, and strategies in Pakistan, highlighting the overlooked role of higher education institutions in the TVET sector.

3.2 Addressing the Gaps in Pakistan's TVET System: Challenges and Reforms

In Pakistan, approximately 3.5 million youth enter the job market annually. There are roughly 500,000 places available in about 4,000 TVET institutions for formal training across the country. This indicates a clear gap between supply and demand. [27]

Additionally, the quality and content of TVET training courses often do not fulfil the skills requirements of the labor market. This calls for sector-wide reforms [28].

To improve this situation, the Government of Pakistan (GoP) has introduced comprehensive reforms in the TVET sector, comprising two phases: phase I (2011–2016) and phase II (2017–2022). As a consequence of these reforms, some significant milestones were achieved, including the formulation of a national TVET policy, the design of the NVQF, the implementation of CBT&A, improvements in TVET governance, increased involvement of the private sector, and the participation of returnee migrants in the labor market [29].

However, it is quite surprising that both these phases of TVET reforms did not explicitly or implicitly include a higher education perspective, such as introducing Doctoral Programs or Integrated Research-based Master's programs leading to a Ph.D. in the TVET context. Figure 1 below illustrates the targets achieved at the end of both phase I and II as a consequence of the TVET reforms. The outcomes of the TVET reforms (2011–2022) evidently prove that none of the outcomes lead to the attainment of higher education qualifications (Ph.D.) in the TVET context.

Nevertheless, the training of chief master trainers, master trainers, teachers, and principals was also achieved through a partnership between a German university and three Pakistani universities. The focus of this partnership project was aimed at launching a teacher preparation program to prepare a new generation of TVET teachers. This postgraduate study program was conducted as a teacher preparation program leading to a postgraduate diploma [30].

Most recently, TVET reforms has now entered in Phase III with assistance of the Federal Republic of Germany focusing on green skills, digitization, and gender as core themes. Ironically, this phase also completely ignored higher education perspective pertaining to introducing international partnerships or may stand alone Doctoral Programs or Integrated Research based Masters programs leading to a Ph.D. in TVET context in Pakistan.

3.3 A Critical analysis of TVET Mission Policies and Strategies in Pakistan

It is worth noting that TVET stakeholders have never prioritized the perspective of Higher Education (HE) or the role of higher education institutions, such as both public and private universities and governing bodies, in Pakistan. While formulating the TVET mission, the National Skills Strategy, and the National TVET policies, the contributions of these institutions have been largely overlooked. This oversight may affect the overall effectiveness and integration of TVET within the broader educational framework. TVET mission and policies inherently remained exclusive of involving higher education perspective in TVET sector. According to World TVET database Pakistan "The TVET mission as defined by the Ministry of Education, Pakistan (MoE) is to provide trained and skilled manpower as required by the Pakistani labor market" [31]. In contrast the TVET mission of Germany as described in World TVET database Germany [32] highlighted the importance of involving HE institutions and aspire to "establishing stronger links between the dual vocational education and training system with institutes of higher education". The sharp contrast is a determinant of fragmented philosophy behind the TVET system which leads to the existing structural discrepancies and implementation shortfalls despite of all efforts to improve the landscape of TVET in Pakistan. The role of higher education while conceiving the TVET reforms has been neglected due to which limited research studies are conducted in exclusively TVET sector. Research studies agreed that quite limited empirical studies and only few professional literature studies are conducted on TVET in Pakistan, specifically pertaining to current TVET sector reforms.

3.4 Analysis of Structure of Formal TVET System in Pakistan – A Comparative Dimension

The existing TVET Policies and national skill strategy has led to three types of TVET systems in Pakistan; Formal, Informal and Non-formal. The higher education sector is integrated into the formal TVET system at the tertiary level and is further elaborated below. In Formal TVET system, the TVET courses are generally offered in designated public schools. MoE Pakistan has introduced an initiative "Agro-Technical Studies" through which TVET subjects are offered in general schools beginning in grade five til grade ten. Since 2000, TVET subjects have been offered in designated secondary schools alongside the general subjects. Post-secondary TVET programs are referred to as Technical Education in Pakistan. Technical education is offered in polytechnic institutions referred to as colleges of technology. The TVET study programs mostly focus on theoretical knowledge and also practical skills imparted to trainee technicians who are expected to work in workshops, industries, and enterprises. [33]

In Pakistan tertiary education does not clearly differentiate between the institutions and universities offering general education and vocational education. In contrast, Germany clearly differentiates between institutions as universities and polytechnics at tertiary level besides imparting dual vocational education and apprenticeships at upper-secondary level. In Pakistan, vocational institutions function at upper-secondary or post-secondary level and are referred to as polytechnic institutions and colleges of tech-

nology. Moreover there are no opportunities for apprenticeships or dual vocational education. [34] In some other developing countries, like Malaysia and India there are Technical Universities (MTUN – Malaysian Technical University Network) and polytechnics respectively functioning at tertiary level [34]. Nevertheless, in Indonesia polytechnics, are attached to universities [35]. The structures of the Formal TVET system given below and the one which practically exists in Pakistan raise a question about the type and role of TVET institutions operating at tertiary level and their relationship with HE – Higher Education institutions (universities offering general education).

3.5 Vocational Qualifications according to National Qualification Framework in Pakistan 2015

The National Qualification Framework (NQF) in Pakistan, designed by the Higher Education Commission (HEC), outlines the levels and standards of TVET qualifications [36]. Higher education covers Levels 5 to 8, with TVET including certificates, diplomas, bachelor's, and master's degrees. Notably, the M.Tech at Level 7 can be awarded with or without a thesis, raising concerns about its compatibility with international programs that require a thesis for a master's degree [37]. This brings into question whether M.Tech graduates can qualify for Ph.D. programs and how this degree serves as a precursor to doctoral studies in TVET. The NQF was updated in 2017 and translated into NVQF for the TVET sector [38].

Although it has been mentioned that these levels will evolve gradually, the process of evolution has still neither been identified nor highlighted as a priority area in Vision 2025. The priority areas highlighted in Final report of Vision 2025 NAVTTC – National Vocational and Technical Training Commission [39] are developing national skills information systems, developing NVQF and assessment procedures, competency based – demand driven training and lifelong learning systems, reforming apprenticeships training including informal apprenticeships, employability of youth through skills training including specific groups such as informal economy and rural areas. Therefore, none of the university exclusively offers structured or semi -structured Doctoral programs or Research based Integrated Master leading to Ph.D. programs in TVET context.

3.6 Status of Doctoral Programs in TVET sector in Pakistan

In Pakistan, there are numerous universities both in the public and private sector offering Ph.D. programs in General Education. However, there is already a great scarcity of research in education in Pakistan, partially because there is a lack of trained people undertaking such research. The majority of Ph.D. programs focus on natural and physical sciences, paying less attention to the development of researchers in social sciences and particularly education [40]. Despite of the fact that many universities offer Ph.D. programs in General Education, none of these are aimed at TVET sector exclusively. Rarely, TVET related themes can be researched through an interdisciplinary approach during doctoral studies. Allama Iqbal Open University [41] is a public university in Pakistan which offers a unique Ph.D. program aiming at distance education, adult edu-

cation, non-formal, informal education, literacy and continuing education program as core themes. This program partially provides a platform for students to research non-formal and informal TVET systems, lifelong learning (as continuing education program) and other TVET topics under the core theme of adult learning. Still this program is not exclusively and explicitly entitled as Ph.D. in technical and vocational education but indirectly deals with themes related to TVET.

As argued earlier in the publication, higher education qualifications such as the Doctorate in TVET has not been prioritized in TVET mission, policies, strategies and TVET reforms until now. Introducing a Doctor of Philosophy in Technical and Vocational Education has never been identified as a priority in Vision 2025. Also, no attempt has been made to include universities or the higher education sector in TVET reforms. National Skills strategy NSS (2009–2013) proposed twenty strategic initiatives out of which "undertaking research" was mentioned as one of the strategic initiatives needed to achieve the objective of quality assurance. [42] This seems quite general and is not fully indicative of introducing a higher education qualification. Rauner and Z. Zhao (2014) argue that:

"TVET research is a unique education sector, which is directly related to the shaping of transition from education to the employment system. This characteristic of TVET, which distinguishes it from all the other sectors of education systems, has far-reaching consequences. TVET is a subject of interdisciplinary education research" [43].

Therefore, it is imperative for the TVET sector in Pakistan to involve universities in designing and launching Doctoral programs exclusively for Technical and vocational education to avoid jeopardizing the fundamentals of TVET research which is mostly infused with underpinnings of general education research and confused with occupational research. Moreover, launching an exhaustive Ph.D. program in the TVET sector can transform Pakistan's research profile by fostering advanced and interdisciplinary research, encouraging publication and dissemination of knowledge, establishing innovation hubs, attracting talent and funding, addressing national challenges, integrating into global research networks, and enhancing academic standards. Research conducted within a doctoral TVET program contributes to the body of academic knowledge through publications in high-impact journals, conferences, and workshops. This enhances the visibility and credibility of Pakistan's research community on a global scale. Specialized research centers of academic excellence can be established within universities focused on TVET and can act as innovation hubs. These centers can drive advancements in vocational training methodologies and technologies. Most significantly research outcomes can inform policy-making, leading to evidence-based decisions to address national challenges through local solutions. This positions academic researchers as key influencers in shaping the future of vocational education. Research tailored to Pakistan's specific industrial and social context can address national challenges effectively through contextualized approach. This can include studies on improving vocational training for rural populations, integrating technology in traditional industries, and developing sustainable practices.

3.7 Essential discoveries from PhD Future in Pakistan

In Pakistan, the Technical and Vocational Education and Training (TVET) sector faces significant challenges due to a substantial gap between the number of youth entering the job market and available training opportunities. Despite reforms undertaken in two phases from 2011 to 2022, which included policy formulation, competency-based training, and private sector engagement, higher education perspectives such as doctoral programs were conspicuously absent. This exclusion limits research and innovation in TVET, contrasting sharply with countries like Germany where vocational education integrates closely with higher education. The current National Vocational Qualifications Framework (NVQF) from 2017 outlines qualifications up to doctoral levels, yet implementation has been slow and lacks alignment with broader educational goals. Moreover, existing doctoral programs in Pakistan predominantly focus on general education, neglecting specialized TVET research needs. Introducing dedicated doctoral programs in TVET could enhance research capacity, foster innovation, and address national challenges effectively, ensuring Pakistan's TVET sector meets global standards and contributes substantively to educational and economic development.

4 PHD in vocational education with focus on India

4.1 Introduction

Vocational education in India is gaining importance as a crucial tool for combating youth unemployment and socioeconomic inequalities. Reports emphasize the need for high-quality Technical and Vocational Education and Training (TVET), supported by Corporate Social Responsibility (CSR). Challenges such as regional disparities highlight the call for comprehensive vocational training programs.

Simultaneously, studies point out systemic challenges in India's Ph.D. landscape, where only a small fraction of students pursue higher degrees due to a focus on basic education and limited incentives for a research career. Reforms by bodies like the University Grants Commission (UGC) are urgently needed to improve the quality of Ph.D. programs and attract more candidates.

Admission to Ph.D. programs in vocational studies requires a postgraduate degree and passing entrance exams such as the UGC NET, opening pathways to careers in higher education and educational leadership.

Strategic initiatives by experts aim to raise India's higher education standards, promote global collaborations, and increase enrollment rates through innovative approaches like online Ph.D. programs.

Research indicates that India, with its young population, affordable education options, and growing global recognition in vocational fields, has the potential to become a leading center for Ph.D. studies, offering promising career prospects in academia and beyond.

4.2 Current State of Vocational Education and PHD in Vocational Education in India

According to the report "Vocational Education: A New Frontier in Skilling for India" by NuSocia Translational Research Centre (NTRC), vocational education in India is crucial, aligning with Mahatma Gandhi's vision of education meeting the country's needs. This is especially relevant now with youth unemployment at 44 % as of Q1 2023, according to the Centre for Monitoring Indian Economy (CMIE). The report addresses issues like rising youth unemployment and socioeconomic inequality, emphasizing the role of Corporate Social Responsibility (CSR) in supporting vocational training initiatives. It underscores the need for high-quality Technical and Vocational Education and Training (TVET) to adapt to job market changes, drawing inspiration from international models such as Germany's TVET system. However, state-level disparities and uneven CSR fund distribution remain challenges despite various legislative efforts. The report calls for both large and small vocational training programs and advocates for a nuanced, inclusive policy approach. [44]

Pushkar's study, "Fraction of PhD Students Has Been Mostly Constant, and Low, in Last Decade," reveals that only about 0.5 % of students in India pursue PhDs, despite increased overall enrollment. This stagnation points to systemic issues such as the focus on undergraduate education, employability challenges, and lack of incentives for research careers. The study emphasizes understanding India's unique context and warns against hasty international comparisons. It calls for immediate action from bodies like the University Grants Commission (UGC) to prioritize research, improve PhD program quality, and enhance the status of academic careers. [45]

For admission to a Ph.D. program in vocational studies or a related field, candidates need a postgraduate degree from an accredited institution with at least 55 % marks. They must also pass a university- or national-level entrance exam. The admission process includes written tests and in-person interviews. [46] Most universities and institutions conduct their own entrance exam for admission to the PhD in Vocational Education program. The entrance exam comprises a written test, followed by a personal interview. The written test usually consists of multiple-choice questions, essay-type questions, and research methodology-related questions.

Numerous advantages come with a Ph.D. in vocational studies, such as chances for licensure, leadership positions in the field of education, and entry into positions at higher levels of employment. It gives people the cutting-edge information and abilities they need to succeed in the teaching profession, especially in programs for vocational training. It also improves decision-making and problem-solving skills, which makes it possible to apply classroom knowledge to real-world situations. Furthermore, a Ph.D. in vocational education develops leadership skills and expertise in instructing people, which improves job prospects and managerial aptitude. However, it is advised that only individuals with a great enthusiasm for the field pursue a Ph.D. in vocational studies. [47]

4.3 Strategic Roadmap for India's Higher Education: Vision 2047

A comprehensive plan outlining a strategic roadmap for India's higher education system was written by Prof. (Dr.) Souvik Bhattacharyya and Chairperson of the FICCI Higher-Ed Committee, Dr. Vidya Yeravdekar. The program, which consists of five five-year programs in a row, is designed to strengthen academic quality, promote global cooperation, and gradually increase the Gross Enrollment Ratio (GER). The framework delineates distinct goals for every stage, encompassing everything from broadening the reach of higher education and creating industry-specific virtual courses to augmenting employability and fortifying worldwide rankings. One noteworthy development that has been emphasised is the emergence of Ph.D. programs offered online by many schools. This is an important tactic to increase flexibility and accessibility for advanced research endeavours. By means of vigilant observation, flexible tactics, and cooperative endeavours with interested parties, the proposed roadmap aims to position India as a global leader in higher education by 2047. [48]

4.4 Future of PHD in Vocational Education in India

Dr. Prabhanjan Giram and Dr. Vivek Borse, in their research article "Perspective of Doctoral Research in India," suggest that India has the potential to become an attractive destination for Ph.D. studies, despite its lower current global university rankings. Key factors include India's youthful population fostering innovation, the affordability and accessibility of Ph.D. programs with English instruction, and available fellowships. The diverse specialization options and improving global recognition of Indian universities also contribute to this potential. These elements collectively position India as a promising contender for international Ph.D. students and may shift perceptions of India's higher education in the future. [49]

A Ph.D. in Vocational Education offers extensive opportunities to explore the chosen field and can lead to a career as a university professor. This program prepares graduates for a teaching career and is suitable for professionals seeking a career change. Aspiring school principals should consider a doctorate in education, as the primary goal of the Ph.D. in Vocational Education is to prepare future educators and leaders for work in the industry. [ibid.]

This Ph.D. program's future scope is open to new possibilities. The bulk of doctorates in the humanities really concentrate on secondary or college education. Because humanities programs are concentrated on training teachers for the future, they have historically been disengaged from teacher preparation. Nonetheless, a growing proportion of graduates with degrees in vocational studies have been employed by the private sector in recent years. [49]

4.5 Primary insights into PhD evolution in India

Vocational education is increasingly recognized in India as vital for addressing challenges like youth unemployment and socioeconomic disparities. Reports emphasize the importance of high-quality Technical and Vocational Education and Training (TVET), supported by Corporate Social Responsibility (CSR) initiatives. Despite obsta-

cles such as regional disparities, there is a growing call for comprehensive vocational training programs.

Research on Ph.D. education in India reveals systemic issues, with a low percentage of students pursuing advanced degrees due to a focus on undergraduate education and limited incentives for research careers. There is a pressing need for reforms from entities like the University Grants Commission (UGC) to enhance the quality of Ph.D. programs.

Admission to Ph.D. programs in vocational studies requires a postgraduate degree and success in entrance exams like UGC NET, offering diverse career paths including roles in academia and educational leadership.

Strategic plans for India's higher education aim to improve academic standards, foster international collaborations, and increase enrollment rates, with initiatives like online Ph.D. programs playing a crucial role.

Research underscores India's potential as a leading destination for Ph.D. studies, buoyed by factors like a youthful demographic, affordable education options, and growing global recognition in vocational fields, providing significant career opportunities in education and beyond.

4.6 Conclusion and Outlook

The need for PhD programs in vocational education in Kazakhstan, Uzbekistan, Pakistan, and India is evident given the economic goals and the necessity for a highly skilled workforce. The introduction of such programs could enhance existing structures and significantly strengthen research in the field of vocational education. This would lead to better alignment of the education system with the demands of the labor market in the long term.

The results of the VoCasian project offer valuable insights and strategies for sustainable vocational education research, including the development and implementation of vocational education-related PhD programs and support during doctoral studies in Kazakhstan.

Developing PhD programs in vocational education is vital for Uzbekistan's educational and economic reforms. Since President Shavkat Mirziyoyev's appointment in 2016, the country has modernized various sectors, including education, aiming to enhance international relations and improve higher education quality with a focus on vocational training.

Meanwhile, Pakistan faces significant challenges in its Technical and Vocational Education and Training (TVET) sector, despite reforms aimed at enhancing training opportunities. There is a notable absence of doctoral programs in TVET, hindering research and innovation crucial for meeting global standards.

In India, vocational education is increasingly recognized as pivotal in addressing youth unemployment and socioeconomic disparities. However, systemic issues in Ph.D. education, such as a focus on undergraduate studies and limited incentives for research careers, necessitate reforms to improve program quality and enrollment rates.

Looking ahead, strategic initiatives and reforms across these countries aim to bridge gaps in vocational education, fostering innovation, and ensuring alignment with global educational standards. Opportunities in academia and beyond are expected to grow, bolstered by advancements in vocational research and education.

References

[1] Ingenieurpädagogik und Didaktik der technischen Bildung (2024): *Abschlusskonferenz. Mitteilung zur Abschlusskonferenz des deutsch-georgischen Forschungsprojekts VoCasian*. Available at: https://www.iptb.ovgu.de/Forschung+und+Entwicklung/VoCasian/Abschlusskonferenz.html. Accessed: 14.06.2024, 11:40 CET.

[2] Jenewein, K.; Karstina, S.; Zechiel, O. (Hrsg.) (2021): *Berufliche Bildung im deutsch-kasachischen Kontext. Duale Ausbildung in Logistik, Mechatronik und nachhaltiger Energieversorgung*. Available at: https://www.wbv.de/shop/openaccess-download/6004866w. Accessed: 14.06.2024, 17:12 CET.

[3] KazDual (2024): *Implementing dual system in Kazakhstan*. Available at: http://www.kazdual.kz/proektnye_rezulytaty. Accessed: 14.06.2024, 17:20 CET.

[4] "Казахстанская правда" (2007): Закон Республики Казахстан от 27 июля 2007 года N 319 Об образовании. N 127 (25372) Ведомости Парламента Республики Казахстан, N 20 (2501), ст. 151. Available at: Zakon-Respubliki-Kazahstan-ot-27-iyulya-2007-goda-N-319-Ob-obrazovanii.pdf. Accessed: 14.06.2024, 17:34 CET.

[5] Әділет (2019): Об утверждении Государственной программы развития образования и науки Республики Казахстан на 2020–2025 годы. Available at: https://adilet.zan.kz/rus/docs/P1900000988/links. Accessed: 14.06.2024, 17:45 CET.

[6] Online.zakon.kz (2022): Приказ Министра просвещения Республики Казахстан от 3 августа 2022 года № 348 Об утверждении государственных общеобязательных стандартов дошкольного воспитания и обучения, начального, основного среднего и общего среднего, технического и профессионального, послесреднего образования. Available at: https://online.zakon.kz/Document/?doc_id=33901530&show_di=1&pos=5;-106#pos=5;-106. Accessed: 14.06.2024, 17:50 CET.

[7] Әділет (2023): On professional qualifications. The Law of the Republic of Kazakhstan dated July 4, 2023 No. 14-VIII. Available at: https://adilet.zan.kz/eng/docs/Z2300000014/history. Accessed: 14.06.2024, 17:56 CET.

[8] Әділет (2022): О признании утратившим силу постановления Правительства Республики Казахстан от 31 декабря 2019 года № 1050 "Об утверждении Государственной программы индустриально-инновационного развития Республики Казахстан на 2020–2025 годы". Постановление Правительства Республики Казахстан от 20 июля 2022 года № 508. Available at: https://adilet.zan.kz/rus/docs/P2200000508#z4. Accessed: 14.06.2024, 17:58 CET.

[9] Online.zakon.kz (2023): УКАЗ ПРЕЗИДЕНТА РЕСПУБЛИКИ КАЗАХСТАН. Об утверждении Национального плана развития Республики Казахстан до 2025 года и признании утратившими силу некоторых указов Президента Республики Казахстан. Available at: https://online.zakon.kz/Document/?doc_id=38490966&pos=2;-106#pos=2;-106. Accessed: 14.06.2024, 18:05 CET.

[10] KazNPU (o. J.): Abai Kazakh National Pedagogical University. Available at: https://www.kaznpu.kz/en/. Accessed: 14.06.2024, 18:12 CET.

[11] Satbayev University (o. J.): Kazakh National Research Technical University. Available at: https://satbayev.university/en/phd. Accessed: 14.06.2024, 18:18 CET.

[12] NEU (o. J.): L. N. Gumilyov Eurasian National University. Available at: https://enu.kz/en/. Accessed: 14.06.2024, 18:23 CET.

[13] Сапаргалиева, Б. О.; Берикханова, А. Е.; Серикова, С. К.; Сабирова, Д. А. (o. J.): ВНЕДРЕНИЕ ДУАЛЬНОЙ СИСТЕМЫ ОБУЧЕНИЯ В ОБРАЗОВАТЕЛЬНОЙ СИСТЕМЕ ОТ ТЕОРИИ К ПРАКТИКЕ.

[14] Сабирова, Д. А.; Молдағали, М. Б. (2022): ВНЕДРЕНИЕ ДУАЛЬНО-ОРИЕНТИРОВАННОГО ОБУЧЕНИЯ В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ (ПЕДАГОГИЧЕСКИЕ СПЕЦИАЛЬНОСТИ): ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ.

[15] Абаева, Г. А.; Акпаева, А. Б.; Сапаргалиева, Б. А. (2022): АНАЛИЗ ГОТОВНОСТИ РАБОТОДАТЕЛЯ К ДУАЛЬНОМУ ОБУЧЕНИЮ.pdf.

[16] DAAD KiWi (2021): Usbekistan. Daten und Analysen zum Hochschul- und Wissenschaftsstandort. P. 4, 9, 16.

[17] Educational Research in Universal Sciences (2023): Multidisciplinary Scientific Journal. Volume 2. Special issue 17. P. 536. Available at: https://erus.uz/index.php/er/article/download/5242/6170/5461. Accessed: 14.06.2024, 18:52 CET.

[18] LexUZ on-line (2021): Decree of the President of the Republic of Uzbekistan, from 31.08.2021 № PP-5241. Available at: https://lex.uz/ru/docs/5610996. Accessed: 14.06.2024, 18:58 CET.

[19] LexUZ on-line (2022): Decree of the President of the Republic of Uzbekistan, from 18.07.2022 № PP-323. Available at: https://lex.uz/docs/6116212. Accessed: 14.06.2024, 19:12 CET.

[20] CIS LEGISLATION (2020): LAW OF THE REPUBLIC OF UZBEKISTAN About education of September 23, 2020, No. ZRU-637. Available at: https://cis-legislation.com/document.fwx?rgn=127569. Accessed: 14.06.2024, 19:21 CET.

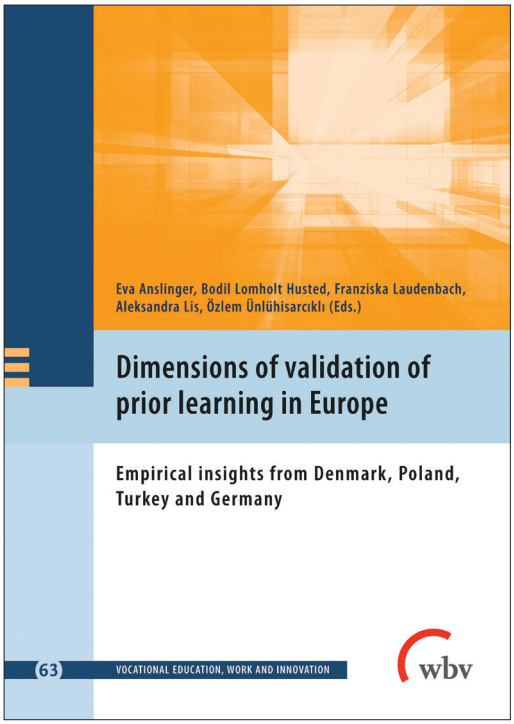
[21] GPE Transforming Education (2019): Education Sector Plan (ESP) of Uzbekistan 2019–2023. P. 111. Available at: https://www.globalpartnership.org/content/education-sector-plan-2019-2023-uzbekistan. Accessed: 14.06.2024, 19:24 CET.

[22] Bq Portal (2020): Berufsbildungssystem Usbekistan. Available at: https://www.bq-portal.de/db/L%C3%A4nder-und-Berufsprofile/usbekistan. Accessed: 13.06.2024, 19:21 CET.

[23] ADB – Asian Development Bank (2022): Развитие профессиональных навыков в Узбекистане. ДОКЛАД ОБ ОЦЕНКЕ СЕКТОРА. P. 29, 59, 86. Available at: https://www.adb.org/sites/default/files/institutional-document/859636/skills-development-uzbekistan-sector-assessment-ru.pdf. Accessed: 13.06.2024, 19:56 CET.

[24] Eshchanov, Ruzumboy et. al. (2020): "THE CURRENT CORE OF EDUCATION REFORMS IN UZBEKISTAN: ONE STEP FORWARDS TWO STEPS BACK?". In European Journal of Research and Reflection in Educational Science, vol 8 No 8, 2020. Available at: https://www.researchgate.net/publication/344735723_The_current_core_of_education_reforms_in_Uzbekistan_one_step_forward_two_steps_back. Accessed: 13.06.2024, 20:28 CET.
[25] TSTU (o. J.): Tashkent State Technical University. Available at: https://www.edugainoverseas.com/tashkent-state-technical-university/. Accessed: 14.06.2024, 20:45 CET.
[26] TSPU (o. J.): Tashkent State Pedagogical University. Available at: https://www.edugainoverseas.com/tashkent-state-pedagogical-university/. Accessed: 13.06.2024, 20:58 CET.
[27] Delegation of the European Union to Pakistan (2020): Technical and Vocational Education and Training (TVET) Sector Support Programme. Available at: https://www.eeas.europa.eu/sites/default/files/tvet_final.pdf. Accessed: 14.06.2024, 12:22 CET.
[28] UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training (2020), TVET Country Profile, Pakistan. Available at: https://unevoc.unesco.org/home/Dynamic+TVET+Country+Profiles/country=PAK. Access: 14.05. 2024 ,13:00 CET.
[29] TVET Reform SSP (2022): TVET Sector Support Programme. Available at: https://tvetreform.org.pk/tvet-reform-support-programme/. Access: 15.05. 2024 ,16:00 CET.
[30] GIZ (2019): Supporting Technical and Vocational Education and Training (TVET) Reform. Available at: https://www.giz.de/en/worldwide/26783.html. Accessed: 10.05.2024, 13:22 CET.
[31] UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training (2013): World TVET Database Pakistan. Available at: https://unevoc.unesco.org/wtdb/worldtvetdatabase_pak_en.pdf 2025.pdf. Accessed: 14.06.2024, 12:22 CET.
[32] Asad, M. M.; Mahar, P.; Datoo, A. K.; Sherwani, F.; Hassan, R. (2023): Impact of quality assurance on TVET programs for the digital employment market of IR 4.0 in Pakistan: A quantitative investigation. Education + Training, 65(6/7), 891–908. Available at: https://doi.org/10.1108/et-08-2022-0295. Accessed: 10.05.2024, 13:33 CET.
[33] UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training (2013): World TVET Database Pakistan. Available at: https://unevoc.unesco.org/wtdb/worldtvetdatabase_pak_en.pdf 2025.pdf. Accessed: 14.06.2024, 12:27 CET.
[34] UNESCO International Centre for Technical and Vocational Education and Training [402], SEAMEO Regional Centre for Vocational and Technical Education and Training (2019): TVET Country Profile Malysia. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000373088. Accessed: 14.06.2024, 12:45 CET.
[35] UNESCO International Centre for Technical and Vocational Education and Training [402], SEAMEO Regional Centre for Vocational and Technical Education and Training (2019): TVET Country Profile Indonesia. Available at: https://unevoc.unesco.org/home/Dynamic+TVET+Country+Profiles/country=IDN. Accessed: 14.06.2024, 12:57 CET.

[36] Higher Education Commission, Pakistan (2015): National Qualifications Framework of Pakistan 2015. Available at: https://www.hec.gov.pk/english/services/universities/pqf/Documents/National%20Qualification%20Framework%20of%20Pakistan.pdf. Accessed: 14.06.2024, 12:22 CET.
[37] Higher Education Commission, Pakistan (2015): National Qualifications Framework of Pakistan 2015. Available at: https://www.hec.gov.pk/english/services/universities/pqf/Documents/National%20Qualification%20Framework%20of%20Pakistan.pdf. Accessed: 14.06.2024, 12:32 CET.
[38] NAVTTC (2017): National Vocational Qualification Framework version 2 NVQF Available at: https://tvetreform.org.pk/wp-content/uploads/downloads/NVQF.pdf. Accessed: 14.06.2024, 12:12 CET.
[39] NAVTTC (2013): Final Report Vision 2025. Available at: https://unevoc.unesco.org/up/Pakistan-TVET-Vision2025.pdf. Accessed: 14.06.2024, 12:02 CET.
[40] Halai, N. (2011). Developing researchers in education through a doctoral programme: A challenge in the context of Pakistan. Pertanika Journal of Social Sciences & Humanities, 19(2), 509–520. Available at: http://ecommons.aku.edu/pakistan_ied_pdck/166. Accessed: 14.06.2024, 12:32 CET.
[41] Allama Iqbal Open University (2022): Ph.D programmes. Available at: https://www.aiou.edu.pk/phd-programmes. Access: 14.06.2024, 12:14 CET.
[42] NAVTTC (2013): Final Report Vision 2025. Available at: https://unevoc.unesco.org/up/Pakistan-TVET-Vision2025.pdf. Accessed: 14.06.2024, 12:07 CET.
[43] Zhao. Z.; Rauner, F. (eds.): Areas of Vocational Education Research. New Frontiers of Educational Research, DOI: 10.1007/978-3-642-54224-4_1, Springer-Verlag Berlin Heidelberg 2014.
[44] NTRC (2024): Vocational Education: A New Frontier in Skilling for India. Available at: https://www.linkedin.com/pulse/vocational-education-new-frontier-skilling-india-nusocia-dmmyc/. Accessed: 17.06.2024, 12:12 CET.
[45] Science the wire (2018): Fraction of PhD Students Has Been Mostly Constant, and Low, in Last Decade. Available at: https://thewire.in/education/india-phd-students-aishe-2018-report-higher-education. Accessed: 17.06.2024, 12:18 CET.
[46] Pragati Singh (2024): PhD: Full Form, Admission 2024, Fees, Syllabus, Entrance Exam, Career Scope. Available at: https://www.shiksha.com/ph-d-chp. Accessed: 17.06.2024, 12:25 CET.
[47] Universitykart (2022): Ph.D. in Vocational Studies. https://universitykart.com/phdcourse/phd-in-vocational-studies. Accessed: 17.06.2024, 12:30 CET.
[48] FICCI-EY-Report (2022): Higher Education in India:Vision 2047. Available at: https://www.ficci-hes.com-FICCI-EY-Report. Accessed: 17.06.2024, 12:35 CET.
[49] Dr. Prabhanjan Giram and Dr. Vivek Borse (2020): PERSPECTIVE OF DOCTORAL RESEARCH IN INDIA. In: DYPIPSR, Pimpri, Pune – 411 018 (MH) INDIA. Pharmaceutical Resonance 2020 Vol. 3 – Issue 1.



Berufsbildung, Arbeit und Innovation, 63
2022, 180 S. 39,90 € (D)
ISBN 978-3-7639-7058-2
E-Book im Open Access

Eva Anslinger, Bodil Lomholt Husted, Franziska Laudenbach, Aleksandra Lis, Özlem Ünlühisarcıklı (Hg.)

Dimensions of validation of prior learning in Europe

Empirical insights from Denmark, Poland, Turkey and Germany

The focus of the anthology is on research into the recognition of non-formal and informal knowledge. Validation is intended to open up new access to the labor market and strengthen cooperation and mobility within the EU. This is where the Erasmus+ project EffectVPL ("Effectiveness of VPL Policies and Programs for Labour Market Inclusion and Mobility - Individual and Employer Perspectives", 2017-2019) comes in, the results of which are presented in this volume. The starting point of the lifelong learning project was the lack of recognition of learning experiences gained outside institutional contexts.

In the first part of the volume, the theoretical foundations are presented, before the authors present empirical results from studies in Poland, Denmark, Turkey and Germany in the second part. Finally, a training module was developed to prepare the project results for teachers in Europe.

wbv.de/bai

Berufsbildung, Arbeit und Innovation, 82
2024, 324 S., 54,90 € (D)
ISBN 978-3-7639-7668-3
E-Book im Open Access

Thomas Deißinger, Oksana Melnyk (Hg.)

Partnership-Based Governance and Standardization of Vocational Teacher Education in Ukraine

This publication addresses the pressing issues of vocational teacher education (VTE), focusing on institutional, organizational and governance aspects. Firstly, it summarizes the results of the four-year Erasmus+ capacity-building project "New Mechanisms of Partnership-based Governance and Standardization of Vocational Teacher Education in Ukraine" (PAGOSTE), funded by the European Education and Culture Executive Agency. The project's focus has been governance in VTE in Ukraine. Secondly, it goes beyond the narrow project context and explores challenges as well as good practices in VTE systems of other countries in and outside of Europe. Therefore, contributions from England, New Zealand, Australia, Italy, Germany, Austria and Switzerland complement the Ukrainian context and provide readers with a more comprehensive understanding of VTE systems.

wbv.de/bai

In a globalized world, education, especially vocational education and training, is becoming increasingly important for economic growth and social stability. Internationalization has become a central topic in this field and can be considered a key aspect for a sustainable education system.

This anthology presents one such project. Otto- von- Guericke University Magdeburg is supporting the Georgian TVET reform by building capacity for TVET research. The project includes the establishment of a graduate school and a doctoral program at the partner university in Tbilisi. The results will be summarized in this book, combining the national perspective with international development trends in the academization of teachers in vocational education and training.

The **Vocational Education, Work and Innovation** series offers a forum for basic and application-oriented vocational training research. It makes a contribution to the scientific discourse on innovation potentials of vocational education and training.

The series is edited by Prof. Marianne Friese (Justus-Liebig-Universität Giessen), Prof. Susan Seeber (Georg-August-University Göttingen) and Prof. Lars Windelband (Karlsruhe Institute of Technology).

The editors of the volume are:

Prof. Dr. Frank Bünning, Professorship of Engineering Education and Didactics of Technical Education at Otto- von- Guericke University (OvGU) Magdeburg and spokesperson for the UNESCO UNEVOC Center Magdeburg

Tamara Hennige, RA at the OvGU Magdeburg

ISBN: 978-3-7639-7716-1

wbv

wbv.de/bai