GUIDELINES
TO VOCATIONAL DISCIPLINES

ALIGNING THE REGIONAL TVET TEACHER STANDARD FOR ASEAN WITH RELEVANT ECONOMIC SECTORS AND OCCUPATIONAL FIELDS

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GUIDELINES TO VOCATIONAL DISCIPLINES

ALIGNING THE REGIONAL TVET TEACHER STANDARD FOR ASEAN WITH RELEVANT ECONOMIC SECTORS AND OCCUPATIONAL FIELDS

SEAMEO VOCTECH AND GIZ

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CONTENTS

ABBREVIATIONS

KMK	Kultusministerkonferenz / Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany
ICT	Information and Communication Technologies
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO-UNEVOC	International Centre for Technical and Vocational Education and Training of the UNESCO

1

INTRODUCTION

1. INTRODUCTION

TVET teacher training and the quality of TVET teachers' work are linked to relevant economic sectors. The availability of qualified personnel is highly dependent on a TVET system that takes into account the innovations, developments and qualification requirements of these sectors.

For economic sectors as well as for employment, classification systems are normally used to structure and mark the main focus, strength and weakness of relevant areas. For employment systems[1], a corresponding qualification system with occupational standards and possibilities for education and career pathways are necessary components for future-oriented developments. Vocational disciplines help to align TVET with the relevant economic and employment sectors.

The definition of *Regional TVET Teacher Standard for ASEAN* (RTTS) based on vocational disciplines which are relevant to ASEAN Member States (AMS) describes a quality standard for TVET teachers. The guidelines help to reflect and understand the meaning of vocational disciplines for TVET teacher's competence profiles, for TVET teacher training, for the shaping of study programmes and for the orientation of TVET systems on economically relevant sectors.

The second version of the RTTS in 2019 focusses on vocational disciplines as a bridge between relevant vocational sciences and pedagogical fields of actions for TVET teachers. It also achieves an actualization of the standards through a closer link to the changes in the world of work. At the same time, these instruments are adjusted to the internationally approved orientations.

[1] For economic sectors, the International Standard Industrial Classification (ISIC) is normally used; see https://unstats.un.org/unsd/classifications/Econ/ISIC.cshtml; for occupations the International Standard Classification of Occupations (ISCO) is used (see https://www.ilo.org/public/english/bureau/stat/isco/index.htm). National classification systems are also available, such as MASCO in Malaysia or PSOC in Philippines.

2

VOCATIONAL DISCIPLINES AS SUBJECT AREAS FOR TVET TEACHERS

2. VOCATIONAL DISCIPLINES AS SUBJECT AREAS FOR TVET TEACHERS

The development of TVET teacher competences is closely linked to study areas of vocational teachers differentiated along vocational disciplines. One central point is that TVET teachers need a "double subject reference" (Spöttl 2014; KMK 2019b, p. 6), a reference to the occupations in a vocational area as subjects[2] and a reference to the corresponding vocational scientific discipline. This double reference is essential for TVET teacher training (developing occupational competence and specific teaching competence) as well as for the TVET teacher profession (determining the content and methodology of learning as typical teacher tasks). The following definition should clarify the meaning of a vocational discipline (see Figure 1).

Vocational Disciplines (formal definition):

Area to be studied by TVET teacher students in order to develop relevant teacher competences to teach occupational subjects in a particular occupational field.

Scientific subject for the clarification of the theory of occupations / occupational competence and the contents of teaching.

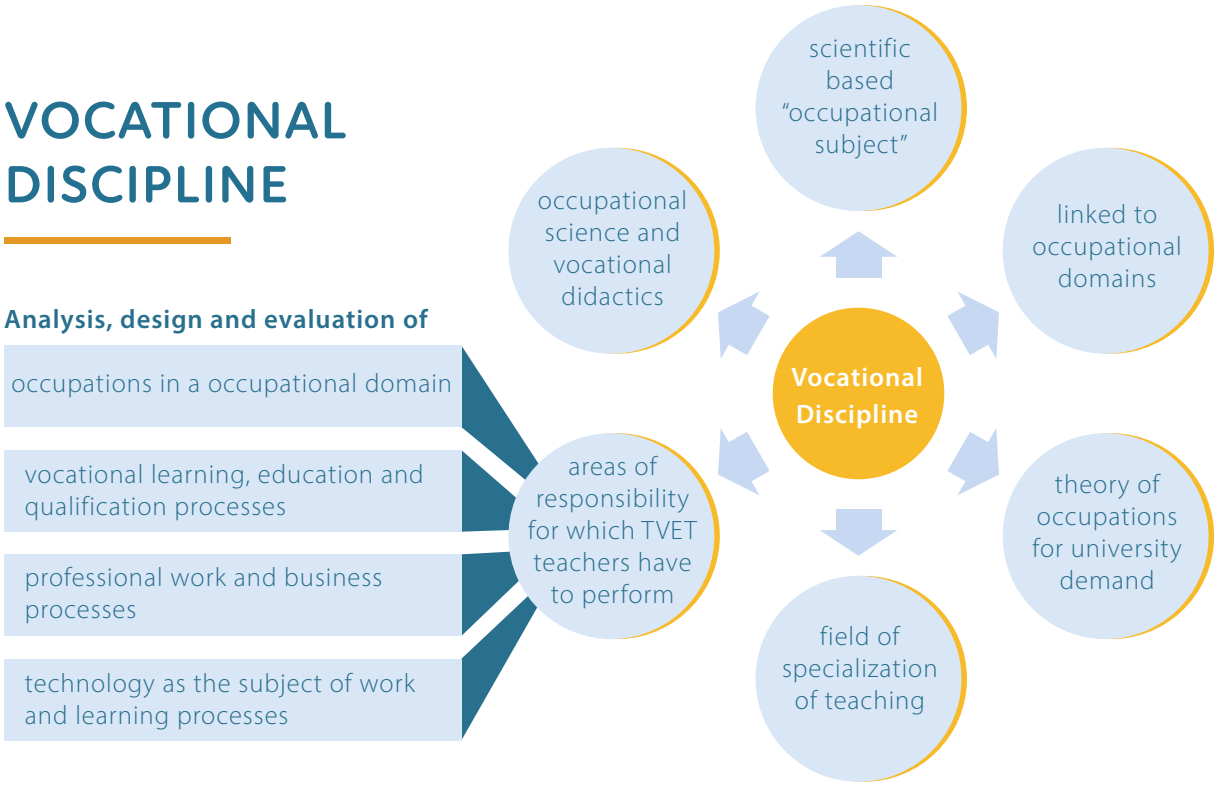

Figure 1: Definition of Vocational Disciplines

[2] This means that the occupation as subject should be one focus for teacher competences and competence development. Mastering the tasks in an occupation requires knowledge, skills and abilities coming not only from the area of scientific disciplines or especially from technology. We call this "work process knowledge" (Boreham/Samurcay/Fischer 2002) as an important competence orientation for TVET teachers.

VOCATIONAL DISCIPLINE IS

- … a theory of occupations for university demand (research) (Pahl 2014, p. 25),
- … linked to occupational domains/occupations in an occupational field. The Hangzhou-declaration (UNESCO 2004) defines a catalogue of twelve vocational disciplines represents the occupational domains in which vocational education takes place,
- … scientific-based "occupational subject",
- … in this sense a combination of occupational science (which identifies the content of professional knowledge and skills for mastering work processes and work tasks in an occupation/occupational competence; see Becker/Spöttl/Windelband 2019, p. 6) and vocational didactics (which answer the question of the relevant content and methodology for teaching),
- … divided into four relevant areas of responsibility for which TVET teachers have to perform in the sense of *analysis*, *design* and *evaluation* of:
  - » occupations in an occupational domain,
  - » vocational learning, education and qualification processes,
  - » professional work and business processes as well,
  - » technology as the subject of work and learning processes,

  in their historical developments, their current manifestations and their future perspectives (see gtw 2010, p. 10),
- … the field of specialization of teaching in the area of VET.

The term "vocational disciplines" is normally used in the area of TVET to clarify the specific learning area and related learning needs for the world of work. Because of the close linkage between the occupational subject and the vocational didactic as parts of a vocational discipline, sometimes the term "vocational disciplines and their didactics" is used. For a deeper discussion see the explanations in Zhao/Rauner (2014).

For the vocational scientific disciplines. UNEVOC (cf. UNESCO 2004, p. 15) defines 12 subject areas listed below:

- Business and Administration
- Production and Manufacturing
- Civil engineering
- Electrical and Electronic Engineering and Information and Communication Technology
- Process Engineering and Energy
- Health Care and Social care
- Education and Culture

- Leisure, Travel and Tourism Agriculture, Food and Nutrition
- Media and Information
- Textile and Design
- Mining and Natural Resources

In this recommendation "Vehicle Technology/Automotive" is integrated with "Production and Manufacturing". Due to the growing importance of the automotive area, this discipline should be added to the list. Likewise, the area of "Information and Communication Technology" should be listed as a separate discipline.

Vocational disciplines help define the area of expertise in vocational action fields. TVET teachers cannot be experts for teaching in all technological fields and for supporting competence development for all occupations. Therefore, a concentration of TVET teacher competences on a specific vocational discipline is necessary.

3

RELEVANCE FOR THE REGIONAL TVET TEACHER STANDARD FOR ASEAN

3. RELEVANCE FOR THE REGIONAL TVET TEACHER STANDARD FOR ASEAN

Competences of TVET teachers have a close interlinkage between different competence areas. On the one hand, they need vocational competences (related to a technical vocational discipline); on the other hand, they need personal, social and occupational competences as well as pedagogical and especially methodological and didactical competences on a scientific reflected level (see Figure 2).

The development of these competences and – of course – the capability of the TVET teachers to perform as part of their duties requires a combination and reference between all named competence areas and especially between the dimensions "vocational pedagogic" and the vocational disciplines as a "subject matter". In general education, the **subject matter** is defined with the help of general scientific disciplines like biology for a biology teacher or technology for a technology teacher. In contrast to this, the subject of a TVET teacher in the area of TVET is one with a "double subject reference" which means that vocational disciplines and referencing occupations are defining the subject matter.

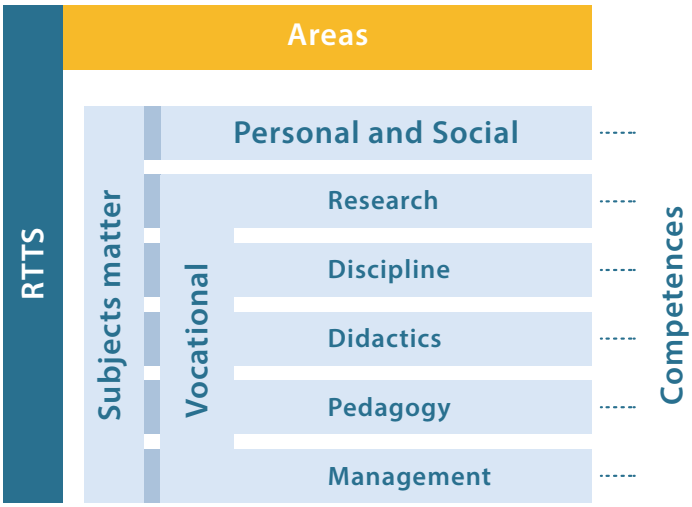

Figure 2: Relevant Areas for the Regional TVET Teacher Standard (RTTS)

The **pedagogical** dimension in TVET should be understood as a bridge between areas of responsibility for identification, preparation and implementation of work (coming from the occupational work tasks) and learning content and processes (Figure 2). This bridge (expressed through the term "vocational") ensures occupational teaching and learning and makes clear that teaching is sometimes fundamentally different from teaching general subjects. In this context, the special significance of vocational learning processes is to secure a vocational ability to support the learners in the working world.

It is a challenge to differentiate between competence areas and, at the same time, to combine and integrate them as a standard. Since competences in reality are not separated from each other, but are identifiable as *outcomes* in terms of performance in the context of tasks, the outcome-standards of RTTS are described as ***competences for TVET teachers.*** These outcome-standards will complete the

expected output and the recommendations for the process and input for TVET teacher training. Vocational disciplines help to describe the interrelationship between qualification requirements in technological occupational fields on the one hand and the necessary orientation of TVET teacher competences on the other.

The RTTS consists of two holistic competence areas described as TVET teacher tasks:

1. ***Personal and Social Competences*** which describe the competences of a TVET teacher to become acquainted with the TVET school as an institution, with the underlying system and the personal attitudes for constant further development of own skills and competences.
2. ***Vocational Research, Discipline, Didactics, Pedagogical and Management Competences*** which describe the competences for identification, preparation and implementation of teaching with the focus on occupations in the vocational field and based on competences in a vocational discipline (for more detail see the tables below). These second point consists of several categories in the setting of priorities:
   a. ***Vocational Research:*** Competences of TVET teachers for determining occupational competence requirements, developments of the occupations and teaching requirements.
   b. ***Vocational Discipline:*** Competences of TVET teachers for analysing the occupational subject (Manufacturing, Automotive, ...) and the referred requirements and changes in the world of work.
   c. ***Vocational Didactics:*** Competences of TVET teachers to choose and structure relevant contents and methods for supporting vocational learning processes.
   d. ***Vocational Pedagogy:*** Competences of TVET teachers for planning, carrying through and assessment of learning sessions.
   e. ***Vocational Management:*** Competences of TVET teachers for organizing and further developing vocational schools and vocational education programmes.

Each of the named categories has links to adjacent categories. Therefore TVET teacher competences can be named and located between two categories (see Table 1). Assignments can be recognised by their proximity to the respective category.

The meaning of vocational disciplines in this context can easily be underpinned by giving examples for a specific discipline. For example, in the vocational disciplines "Vehicle Technology/Automotive", TVET teachers should be able to analyse the occupations, the occupational competence requirements and determine the domain specific learning needs. They should also be able to handle the structures behind the skilled work for determining suitable learning approaches. In more specific terms (c.f. Becker 2010; gtw 2010):

Automotive Teachers must have competences in:

I. Analysis, design and evaluation of the maintenance technology/service and the related work processes:

- Operating, work and training structures in the automotive trade and in the automotive industry and their service functions;
- Service concepts, business areas, workshop organization and quality management in the dealership in connection with basic service and repair of cars, commercial vehicles, motorcycles and other two-wheelers and agricultural and construction machinery;
- Knowledge management in the automotive trade and in the automotive industry;
- Procedures for customer care, customer loyalty and analysis of customer satisfaction;
- Workshop management with a focus on workshop equipment, order planning and tracking and spare parts logistics, including documentation and workshop networks;
- Maintenance procedures in motor vehicle service as well as care and maintenance of motor vehicles in order to maintain the functional operation taking into account ecological principles;
- Inspection tasks on the engine, drive, chassis, body and electrical equipment, including the function control of cross-system mechatronic systems;
- Monitoring of vehicles taking into account the legal framework.

II. Analysis, design and evaluation of the diagnosis/vehicle electronics and the related work processes:

- Diagnostic systems for troubleshooting in vehicle technology;
- Expert systems, tele-diagnosis and computer-aided diagnosis tools and their use for rule- and experience-based diagnosis;
- Fault diagnosis of the drive and vehicle dynamics systems, including their electronic control systems;
- Fault diagnosis of vehicle information and communication systems, comfort systems, safety systems and vehicle networking;
- Fault diagnosis of vehicle engines with regard to consumption, exhaust emissions and start / operating behaviour;
- Condition determination, configuration and adaptation of systems in vehicle electrics and electronics, including on-board systems with the help of computer-aided diagnosis systems.

III. Analysis, design and evaluation of repair procedures/repair technology:

- Damage analysis and damage calculation on accidented vehicles and their repair, including measurement, straightening, bodywork and painting work, taking into account modular body structures;
- Repair procedures to restore the functional, operational and traffic safety of vehicle systems;
- Exchange and repair of vehicle assemblies of the engine, drive, chassis and electronic devices taking into account mechatronic structures and from a cost perspective;
- (Special) tools and special repair procedures for current vehicle repair.

IV. Analysis, design and evaluation of vehicle technology/vehicle system technology and the related work processes:

- Social importance of vehicles and the importance of motor vehicle craft and industry; the interaction of humans and motor vehicles as well as the effects on the environment;
- System technology developments to meet future social, economic and ecological requirements for the automobile; alternative drives (hybrid, electric), systems and measures to reduce emissions and resources;
- Analysis of retrofitting options to increase the environmental compatibility and safety of (old) vehicles under the aspects of feasibility and usefulness;
- Modification of vehicles according to customer requirements such as chassis changes, equipment, superstructures, etc., taking into account relevant regulations and taking into account increasing information technology networking in the vehicle;
- Occupational safety, traffic safety and environmental compatibility in the motor vehicle service due to the increasing introduction of driver assistance systems, human-machine systems and complex vehicle architectures

The exemplary description of the TVET teacher competences for the Vocational Discipline "Vehicle Technology/Automotive" shows the difference between typical engineering competences or technical competences as subject matter and TVET teacher competences. While engineers calculate, develop and design vehicle technology, TVET teachers reflect existing vehicle technology and focus on service and repair, diagnosis and equipping of modern vehicle technology with diagnostic tools and other digitalized facilities.

Table 1: Competences of TVET teachers and their assignment to vocational disciplines and other vocational categories

Vocational Research	Determine occupational competence requirements	Derive respective learning efforts and training needs	***Vocational Discipline***
Vocational Discipline	Analyse technology and its meaning for learning in the context of organization, methods, tools, equipment and materials in the world of work	Analyse the requirements of technology and the changing work and develop strategies or modes for learning in different learning environments	***Vocational Didactics***
	Develop curricula for TVET at school level and participation at national level	Analyse didactical approaches and evaluate their use for learning in the context of digital technology and changes of work and work organization	
Vocational Didactics	Design learning sessions through use of innovative teaching methods to open up the complexity of work	Develop school-based curricula, syllabus and learning material for use in innovative teaching	***Vocational Pedagogy***
	Plan theoretical and practical lessons in classrooms and workshops	Carry through learning sessions to support competence development of learners	
		Carry out assessments and evaluations of the learners' occupational competence	
Vocational Pedagogy	Accompany students' competence development reflecting the competence development level, living environment and individual learning conditions	Shape the learning and school culture and further develop the school environment to encourage lifelong learning	***Vocational Management***
	Improve learning and interaction processes by choosing and developing suitable methods	Shape and manage learning and work environments	

4

PRACTICAL STEPS TO IDENTIFY VOCATIONAL DISCIPLINES AND ALIGNING THEM WITH THE REGIONAL TVET TEACHER STANDARD FOR ASEAN

4. PRACTICAL STEPS TO IDENTIFY VOCATIONAL DISCIPLINES AND ALIGNING THEM WITH THE REGIONAL TVET TEACHER STANDARD FOR ASEAN

Aligning the *Regional TVET Teacher Standard for ASEAN* with the relevant economic sectors and occupational fields in the planning process of teacher training is one of the requirements in the establishing process of training concepts.

The following steps will give an overview of the implementation process of vocational disciplines and teacher training (cf. Table 2).

Table 2: Application Steps for applying Vocational Disciplines

Step	Application Process
1	Identification of relevant fields of TVET teacher training in a country.
2	Comparison of the relevant fields of teacher training with economic sectors in the country and selection of vocational scientific disciplines based on one or more of the 12 subject areas of UNEVOC (see above).
3	Definition of the vocational scientific disciplines for TVET teacher training.
4	Definition of the discipline relevant standards for TVET teacher training.
5	Definition of the relevant subject areas supporting the vocational scientific disciplines and other relevant topics of teacher training to support domain specific learning needs.

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GUIDELINES TO MONITORING AND ASSESSMENT OF TVET TEACHER'S PERFORMANCE AND QUALITY

GUIDELINES
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