

Contents

Foreword	11
Foreword	13
Preface	15
1 Introduction	17
2 Development Trends of Digitalization	19
2.1 Character of digitalization	19
2.2 Changes in the world of work	20
2.2.1 The scope of digitalization	20
2.2.2 Technological view of development	22
2.2.3 The digital economy and the change in the structure of work	24
2.2.4 Selected studies and analytical material	26
2.3 Need for competences	39
2.3.1 Competences from the perspective of technological change	39
2.3.2 Competences from the perspective of work change	40
2.4 Conclusions	44
3 Development of an Innovative Concept of Learning and Teaching	49
3.1 The foundation of the concept	49
3.2 Overview of the training concept	50
3.3 Module structure of five modules	52
3.4 Definition of training modules for TVET professionals	53
3.4.1 Module 1: Innovative teaching and learning for industry changes due to Industry 4.0	53
3.4.2 Module 2: Professional development training for TVET teachers on Industry 4.0	54
3.4.3 Module 3: Curriculum design for Industry 4.0 work-process	55
3.4.4 Module 4: Quality Assurance and Quality Development in TVET institutions	56
3.4.5 Module 4: Quality Assurance and Quality Development in TVET institutions	57
3.4.6 Module 5: Industry and TVET institutions linkages	57
4 Didactical Concept and Transfer into Learning Processes	59
4.1 Introduction	59
4.2 Framework of the didactical concept	60

4.3	The target group	62
4.4	Self-reliant learning	63
4.4.1	Justification of self-reliant learning	64
4.4.2	Strong association between human action and learning	65
4.4.3	Action competence	66
4.4.4	Changes require a new kind of learning in TVET	68
4.5	A new didactic approach for TVET	71
4.5.1	Objectives of learning in TVET	72
4.5.2	New subjects for TVET	74
4.5.3	Designing work-process related curricula for TVET	74
4.5.4	Learn- and Work Assignments as core elements of TVET	75
4.5.5	Assignments on three levels of learning and working	76
4.6	Self-reliant learning and trainee centred teaching	79
4.7	Learn- and Work Assignments and trainee-centred teaching	80
4.7.1	Characteristics	80
4.7.2	Practical Issues	84
4.8	Learning theories	85
4.8.1	Jean Piaget: The theory of equilibration - “acting to know”	86
4.8.2	Lev Vygotsky: The theory of the social construction of knowledge and cognitive processes	88
4.8.3	Jean Lave and Etienne Wenger: The theory of learning in social relationships	90
5	Transfer of the Training Concept into Training	93
5.1	Concept of Learn- and Work Assignments for teaching and learning	94
5.2	Learn- and Work Assignments as supporters of quality	95
5.3	Developing Learn- and Work Assignments	96
5.4	Description of Module 1	99
5.5	Generating LWA and LWA’ descriptions	102
5.5.1	LWA 01 TT	102
5.5.2	LWA 02 TT	103
5.5.3	LWA 03 TT	104
5.5.4	LWA 04 TT	104
5.5.5	Summary	106
5.6	Outline of Learn- and Work Assignments	106
6	Implementation Process of the Modules and In-Service Training	115
7	Conclusion	119
	Bibliography	121
	List of Figures	125

List of Tables	125
Attachment	127
Description of Modules 02 and LWAs	127
Module 02 PTT: Professional Development Training for TVET Teachers in Industry 4.0	129
Description of Modules 03 and LWA	139
Module 03 CTT: Curriculum Design for Industry 4.0 Work-Process	141