Twin digital and green
transition for furniture
and textile industries

Joint Curriculum on twin transition for SMEs of manufacturing and traditional sectors

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TWIN REVOLUTION PROJECT

The TwinRevolution project is dedicated to supporting Vocational Education and Training (VET) learners in the textile and furniture industries as they embark on their twin transition journey. By enhancing their digital and green skills, the project aims to equip professionals from these sectors with the necessary expertise to thrive in a sustainable, circular, and digitally enabled industry.

Recognizing the need to align VET offerings with industry requirements to facilitate a twin digital and green transition in manufacturing and traditional sectors, the primary objective of the TwinRevolution project is to develop an innovative and interactive tool, along with a comprehensive training course. These resources will serve to upskill and reskill VET learners, including those from upper secondary schools and current workers, empowering them with the essential digital and green skills and competences needed for success.

This document provides an overview of the planned training course, which will be developed within the framework of the TwinRevolution project. The course will feature a joint curriculum focused on twin transition in the manufacturing sector, outlining the designated learning paths that ensure effective knowledge acquisition. Key skills and competences will be grouped into a series of training modules and units, promoting a cohesive and comprehensive learning experience. Additionally, the harmonization of this Joint Curriculum with the European Qualifications Framework will ensure compatibility and recognition across European contexts.

For more information, go to https://twinrevolution.eu

JOINT CURRICULUM STRUCTURE

During the development of the first result of the TwinRevolution project, the key learning outcomes that are essential for the green and digital transition were identified. These are set out in the report PR1-A1 "Twin transition in the manufacturing sector: A blueprint". These learning outcomes encompass knowledge, skills, and competences necessary to navigate the transition towards a sustainable, circular, and digitally advanced manufacturing industry in the furniture and textile sectors.

In terms of knowledge, learners will delve into various aspects such as understanding the concept of Circular Economy and its current status, grasping the concept of Industry 4.0 and its relevance in today's landscape, and comprehending the state of digital and green transition within the furniture and textile sectors. Additionally, learners will explore the interconnections between green and digital transition and gain insight into industry 4.0 technologies that support circularity in these sectors. Understanding the policy landscape at the EU level, as well as companies' best practices in green and digital transition, will further enhance their knowledge base.

The development of skills is another crucial aspect of the TwinRevolution training. Learners will acquire the ability to identify and recognize key circular strategies, tools, and processes applicable to the textile and furniture industry. They will also gain proficiency in identifying relevant industry 4.0 technologies that can be leveraged in the textile and furniture sectors. Furthermore, learners will develop the competence to analyse, compare, and select circular strategies and industry 4.0 technologies that align with the needs of the manufacturing industry.

To ensure a structured and comprehensive learning experience, the identified learning outcomes have been organized into four modules. These modules cover various aspects of the Twin Revolution, including an introduction to the twin transition towards a green and smart manufacturing industry, the application of circular economy principles in the manufacturing industry, the

utilization of industry 4.0 technologies, and the integration of green and digital transition.
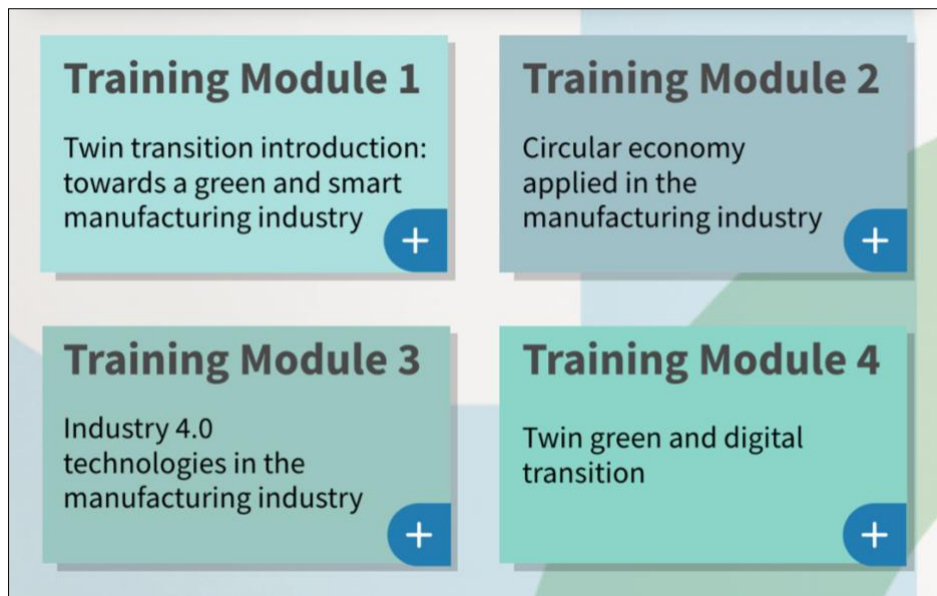
Figure 1: TwinRevolution Training Modules.

Within each module, specific units have been defined, carefully tailored to address the needs and priorities of the textile and furniture industry. This systematic approach ensures that learners receive a well-rounded education that is relevant and aligned with the demands of their respective sectors.

This work is linked to the specific project objective *SO3. Design a Joint Curriculum for VET for new trainings that meets and addresses the needs and priorities of the twin transition on SMEs of manufacturing sectors.*

By equipping learners with the necessary knowledge, skills, and competences, the Twin Revolution project aims to empower individuals to actively contribute to the transformation of the manufacturing industry towards a sustainable and digitally advanced future.

Breakdown of the modules

The TwinRevolution training course comprises of four interconnected and complementary training modules. Each module has been carefully structured into distinct units, designed to facilitate the learning process, and ensure a smooth transition throughout the entire training course.

Module 1	Twin transition introduction: towards a green and smart manufacturing industry
LU1	Manufacturing Industry in transition.
LU2	Introduction to Industry 4.0.
LU3	Introduction to Circular Economy
LU4	Introduction to twin green & digital Transition
Module 2	**Circular economy applied in the manufacturing industry**
LU5	Circular economy definitions
LU6	Circular economy framework and principles
LU7	Circular economy benefits and challenges
LU8	Strategies for the furniture sector (best practices and examples)
LU9	Strategies for the textile sector
LU10	Tools and processes (for the implementation of CE in the manufacturing Industry)
Module 3	**Industry 4.0 technologies in the manufacturing industry**
LU11	Overview of I4.0 technologies
LU12	Benefits and challenges of I4.0 technologies
LU13	Relevant I4.0 technologies in the Furniture sector
LU14	Relevant I4.0 technologies in the textile sector
Module 4	**Twin green and digital transition**
LU15	Twin green and digital transition in the life cycle chain.
LU16	Applications of twin green and digital transition in the furniture sector
LU17	Applications of twin green and digital transition in the textile sector

The table below presents the four modules, their corresponding component units, the learning pathway, and the allocated time in hours for each module:

Table 1: Breakdown of the modules. Structure of the Joint Curriculum.

Structure of the Joint Curriculum		Pathways			ToTal Hours
		General	Furniture	Textile	
MODULE 1	**TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY**				2,50
LU1	Manufacturing Industry in transition	x	x	x	
LU2	Introduction to Industry 4.0	x	x	x	
LU3	Introduction to Circular Economy	x	x	x	
LU4	Introduction to twin green & digital Transition	x	x	x	
MODULE 2	**CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY**				17
LU5	Circular economy definitions	x	x	x	
LU6	Circular economy framework and principles	x	x	x	
LU7	Circular economy benefits and challenges	x	x	x	
LU8	Strategies for the furniture sector (best practices and examples)	x	x		
LU9	Strategies for the textile sector	x		x	
LU10	Tools and processes (for the implementation of CE in the manufacturing Industry) – Practical	x	x	x	
MODULE 3	**INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY**				17
LU11	Overview of I4.0 technologies	x	x	x	
LU12	Benefits and challenges of I4.0 technologies	x	x	x	
LU13	Relevant I4.0 technologies in the Furniture sector	x	x		
LU14	Relevant I4.0 technologies in the textile sector	x		x	
MODULE 4	**TWIN GREEN AND DIGITAL TRANSITION**				13,5
LU15	Twin green and digital transition in the life cycle chain. (Both sectors)	x	x	x	
LU16	Applications of twin green and digital transition in the furniture sector	x	x		
LU17	Applications of twin green and digital transition in the textile sector	x		x	
					50,00

HARMONIZATION OF THE LEARNING OUTCOMES

To facilitate the harmonization and understanding of qualifications across various countries and educational systems, the European Commission launched a common reference framework, the European Qualifications Framework (EQF)[1]. Its purpose is to enhance the readability and comprehensibility of qualifications across different countries and systems. The EQF covers qualifications at all levels and in all sub-systems of education and training, providing a comprehensive overview of qualifications in the 39 European countries currently involved in its implementation.

At the heart of the EQF are its eight reference levels, which are defined in terms of learning outcomes. These levels articulate the knowledge, understanding, and skills individuals possess upon completing a learning process. Each level is accompanied by a set of descriptors that outline the specific learning outcomes associated with qualifications at that particular level. These descriptors encompass a wide range of competences and proficiencies. It is important to note that the EQF operates on a scale where level 1 represents the lowest proficiency, while level 8 signifies the highest level of achievement.

Significantly, the EQF is closely interconnected with national qualification frameworks (NQF)[2]. By establishing these connections, the EQF can provide a comprehensive map of all types and levels of qualifications in Europe. The increasing accessibility of qualification databases further enhances the EQF's ability to provide valuable insights into the European qualifications landscape.

To provide a more detailed understanding of the EQF's eight reference levels and their associated descriptors, please refer to the table 2.

This table offers a comprehensive breakdown of the various levels within the EQF, helping to elucidate the different proficiencies and competences associated with each level. By utilizing this framework and its reference levels,

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[1] Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualification Framework for lifelong learning – 2008/C 111/01
[2] National Qualification Frameworks (NQFs). https://europa.eu/europass/en/europass-tools/european-qualifications-framework/national-qualifications-frameworks

stakeholders in education, training, and employment can better navigate and comprehend qualifications within the European context.

Table 2: Descriptors defining levels in the European Qualifications Framework (EQF)

	Knowledge In the context of EQF, knowledge is described as theoretical and/or factual.	Skills In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).	Responsibility and autonomy In the context of the EQF responsibility and autonomy is described as the ability of the learner to apply knowledge and skills autonomously and with responsibility
Level 1	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups

Level 7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

Introducing National Qualification Frameworks and their Interconnection with EQF for the TwinRevolution course.

In the context of the TwinRevolution course, it is important to understand the harmonization of qualifications across different countries and educational systems. To facilitate this harmonization, the European Qualifications Framework (EQF) serves as a common reference framework. Additionally, several countries, including the ones of the consortium Czech Republic, Germany, Finland, and Spain, have developed their own National Qualification Frameworks (NQFs) that interconnect with the EQF.

The **Czech Republic** has implemented its National Qualifications Framework (NQF) with the aim of ensuring transparency and maintaining high quality in qualifications within its education and training systems. Aligned with the European Qualifications Framework (EQF), the Czech NQF establishes a well-defined and structured classification of qualifications, enabling comparability across different sectors and educational levels. This harmonization facilitates a clear understanding and recognition of qualifications, both nationally and internationally, enhancing transparency and promoting mobility for learners

and professionals within and beyond the Czech Republic. By aligning with the EQF, the Czech NQF contributes to the overarching goal of promoting a standardized and interconnected qualifications framework across Europe.

Table 3: Czech education qualification types, NSK levels and links to EQF levels [1]

EQF levels	Czech qualification types (*)	NSK levels
8	**Doctoral programme** PhD degrees three to four years beyond master (*doktor*)	8
7	**Master programme** Mgr, MgA., Ing., Ing. arch., MUDr, MDDr, MVDr, JUDr, PhDr, RNDr, Pharm.Dr, ThLic., and ThDr degrees one to three years of tertiary education beyond bachelor or four to six years of tertiary education (*magistr, inženýr, doktor*)	7 e.g. Senior detective (*vedoucí detektiv*) Chemical engineer product manager (*inženýr chemie produktmanažer*)
6	**Bachelor programme** Bc and BcA degrees three to four years of tertiary education (*bakalář*) **Tertiary vocational education** DiS degree three to three-and-a-half years of tertiary education (*diplomovaný specialista*)	6 e.g. Career counsellor for educational and professional path (*kariérový poradce pro vzdělávací a profesní dráhu*) Independent research and development electrician (*samostatný elektrotechnik výzkumný a vývojový pracovník*)
5		5 e.g. Tour guide (*průvodce cestovního ruchu*) Agricultural advisor for plant production (*zemědělský poradce pro ochranu rostlin*)
4	**Upper secondary education with maturita exam** General education (*Gymnazium*) – four years of upper secondary study **Upper secondary education with maturita exam** Vocational education – four years of upper secondary study **Supplementary study leading to a maturita exam** Two years of study after the VET certificate	4 e.g. Quality management specialist in engineering (*technik řízení jakosti ve strojírenství*) Detective trainee (*detektiv koncipient*)
3	**Upper secondary education with VET certificate** Vocational education – three years of upper secondary study	3 e.g. Glassmaker for pressed glass (*sklář lisovaného skla*) Locksmith (*zámkař*)
2	**Lower secondary education** Completion of a lower secondary general education programme – nine years	2 e.g. Production of side dishes (*výroba příloh*) Guard (*strážný*)
1	**Special education** Completion of an educational programme in a special school – 10 years	1

Germany has implemented its national framework, the Deutscher Qualifikationsrahmen (DQR), which closely aligns with the European Qualifications Framework (EQF). The DQR plays a crucial role in ensuring compatibility and recognition of qualifications both within Germany and across

Europe. By establishing this connection to the EQF, the DQR enhances transparency, facilitating a clear understanding of qualifications and promoting mobility for learners and workers. This framework provides a standardized reference point for classifying qualifications, enabling individuals to effectively navigate the German education and training system while also facilitating their recognition and comparability throughout Europe. The DQR's integration with the EQF contributes to the broader objective of fostering a unified qualifications framework and promoting harmonization across European countries.

Table 4: German national qualifications framework (DQR). Adapted from the Royal decree 1027/2011 of 15 July 2011 on the establishment of the Spanish qualifications framework of higher education [1].

DQR levels	Qualifications	EQF levels
8	Doctorate (*Doktor*)	8
7	Master degree (*Master*) Strategic IT professional (certified) (*Strategischer IT Professional (Geprüfter)*) Other further vocational training qualifications according to Vocational Training Act and Handicraft Code (level 7)	7
6	Bachelor degree (*Bachelor*) Commercial specialist (certified) (*Fachkaufmann (Geprüfter)*) Business management specialist (certified) (*Fachwirt (Geprüfter)*) Master craftsman (certified) (*Meister (Geprüfter)*) Operative IT professional (certified) (*Operativer IT Professional (Geprüfter)*) Trade and technical school (State-certified) (*Fachschule (Staatlich Geprüfter)*) Other further vocational training qualifications according to Vocational Training Act and Handicraft Code (level 6)	6
5	IT specialist (certified) (*IT-Spezialist (Zertifizierter)*) Service technician (certified) (*Service-techniker (Geprüfter)*) Other further vocational training qualifications according to Vocational Training Act and Handicraft Code (level 5)	5
4	Upper secondary general education school leaving certificate (*Allgemeine Hochschulreife (AHR)*) Qualification entitling holder to study particular subjects at a higher education institution (*Fachgebundene Hochschulreife (FgbHR)*) Qualification entitling holder to study at a university of applied sciences (*Fachhochschulreife (FHR)*) Dual VET (three-year and three-and-a-half-year training courses) Full-time vocational school (regulated under *Länder* law) (*Berufsfachschule*) Full vocational qualification (full-time vocational school) (*Berufsfachschule*)	4
3	General education school leaving certificate after 10 years at Realschule (*Mittlerer Schulabschluss*) Dual VET (two-year training courses) Full-time vocational school (general education school leaving certificate obtained on completion of grade 10 at Realschule or, under certain circumstances, at other lower secondary school types) (*Mittlerer Schulabschluss (Berufsfachschule)*)	3
2	Lower secondary school leaving certificate after nine years (*Hauptschulabschluss*) Vocational training preparation (*Berufsausbildungsvorbereitung*) Employment agency measures (*Maßnahmen der Arbeitsagentur*) Year of pre-vocational training (*Berufsvorbereitungsjahr*) Introductory training for young people (*Einstiegsqualifizierung*) Basic vocational training (*Berufliche Grundbildung*)	2
1	Vocational training preparation (*Berufsausbildungsvorbereitung*) Employment agency measures (vocational preparation schemes) (*Maßnahmen der Arbeitsagentur*) (*Berufsvorbereitende Bildungsmaßnahmen*) Year of pre-vocational training (*Berufsvorbereitungsjahr*)	1

Finland's National Qualifications Framework (FINQF) is closely aligned with the European Qualifications Framework (EQF), ensuring a harmonized approach to qualifications. The FINQF plays a pivotal role in defining the learning outcomes and competences associated with qualifications, providing a clear and comprehensive understanding of their value. This framework promotes transparency by establishing a common language for describing qualifications and enabling individuals to assess their skills and knowledge both within Finland and internationally. The FINQF's compatibility with the EQF enhances comparability, facilitating recognition and mobility for learners and professionals across borders. By adhering to the EQF, Finland demonstrates its commitment to fostering a transparent and internationally recognized qualifications system that benefits individuals seeking to advance their careers or pursue further education opportunities.

Table 5: Finnish national qualifications framework (FiNQF) [1].

FiNQF levels	Qualification types	EQF levels
8	Licentiate & Doctor degrees – universities and the National Defence University's scientific and artistic postgraduate degrees (*Lisensiaatin ja tohtorin tutkinnot*) General staff officer degree (*Yleisesikuntaupseerin tutkinto*) Specialist degree in veterinary medicine (*Erikoiseläinlääkärin tutkinto*) Specialist training in medicine (*Erikoislääkärikoulutus*) Specialist training in dentistry (*Erikoishammaslääkärikoulutus*)	8
7	Master degrees – universities (*Ylemmät korkeakoulututkinnot*) Master degrees – universities of applied sciences (*Ylemmät ammattikorkeakoulututkinnot*)	7
6	Bachelor degrees – universities (*Alemmat korkeakoulututkinnot*) Bachelor degrees – universities of applied sciences (*Ammattikorkeakoulututkinnot*)	6
5	Specialist vocational qualifications (*Erikoisammattitutkinnot*) Sub-officer qualification – Fire and rescue services (*Alipäällystötutkinto – Pelastusala*) Vocational qualification in air traffic control (*Lennonjohdon perustutkinto*)	5
4	General upper secondary school leaving certificate (*Lukion oppimäärä*) Matriculation examination (*Ylioppilastutkinto*) Upper secondary vocational qualifications (*Ammatilliset perustutkinnot*) Further vocational qualifications (*Ammattitutkinnot*) Basic examination in prison services (*Rikosseuraamusalan tutkinto*) Fire fighter qualification (*Pelastajatutkinto*) Emergency response centre operator qualification (*Hätäkeskuspäivystäjätutkinto*)	4
3		3
2	Basic education certificate (9 years) (*Perusopetuksen oppimäärä*)	2
1		1

In **Spain**, it is also important to highlight the Spanish Framework for Education and Qualifications (MECU), which is the result of the integration of the National Catalogue of Professional Qualifications (CNCP) and the Spanish Framework of Qualifications for Higher Education (MECES). The MECU provides a comprehensive framework that encompasses both professional qualifications and higher education qualifications in Spain.

The CNCP, part of the MECU, is responsible for classifying and describing professional qualifications, ensuring transparency and comparability among them. On the other hand, the MECES, also integrated into the MECU, deals with higher education qualifications, establishing the corresponding levels and descriptors.

The combination of the CNCP and the MECES within the MECU offers a complete view of qualifications in Spain and facilitates their understanding and recognition both nationally and internationally.

Table 6: Spanish qualifications framework for higher education (MECES), National Catalogue of Professional Qualifications (CNCP), Spanish qualifications framework for lifelong learning (MECU) and EQF relation [1] [2] [3].

MECU	CNCP		MECES			EQF
Level	Level	Acreditation	Level		Certification	Level
Level 1	Level 1	Operario				Level 1
Level 2						Level 2
Level 3	Level 2	Técnico Medio				Level 3
Level 4						Level 4
Level 5	Level 3	Técnico Superior	Level 1	Técnico Superior	Técnico Superior de Formación Profesional	Level 5
					Técnico Superior de Artes Plásticas y Diseño	
					Técnico Deportivo Superior	
Level 6	Level 4	Grado	Level 2	Level 6	Título de Graduado	Level 6
					Título de Graduado en Enseñanzas Artísticas y Superiores	
Level 7	Level 5	Master	Level 3	Level 7	Título de Máster Universitario	Level 7
					Título de Máster en Enseñanzas Artísticas	
					Título de Graduado de 300 ECTS con 60 ECTS de Nivel de Máster	
Level 8	no defined	Doctor	Level 4	Level 8	Título de Doctor	Level 8

These national frameworks, such as the NQFs of the Czech Republic, Germany, Finland, and Spain, play a vital role in the TwinRevolution course. Through the alignment of their frameworks with the EQF's reference levels and descriptors, these countries ensure compatibility, comparability, and

recognition of qualifications. This harmonization enhances transparency, mobility, and transferability of qualifications across diverse countries and educational systems, establishing a strong foundation for the TwinRevolution course to effectively navigate and utilize qualifications.

TwinRevolution EQF and NQF level

The TwinRevolution course is appropriately positioned at EQF Level 4, which corresponds to an intermediate level of qualifications. This level is characterized by the acquisition of a broad range of knowledge, skills, and competences that are applicable in various professional contexts. Here is a justification for framing the TwinRevolution course at EQF Level 4 and its relationship with the corresponding NQF levels in Finland, the Czech Republic, Germany, and Spain:

Finland (FINQF Level 4):

The TwinRevolution course aligns with FINQF Level 4 in Finland. At this level, learners develop a solid foundation of theoretical and practical knowledge, enabling them to perform complex tasks independently. The course equips participants with the necessary skills to contribute effectively in professional settings, promoting their employability and potential for career advancement.

The Czech Republic (Czech NQF Level 4):

The TwinRevolution course aligns with the Czech NQF Level 4, which emphasizes the acquisition of practical skills and competences for a specific occupation. By participating in the course, learners gain industry-relevant knowledge and develop their ability to apply it in real-world scenarios. This aligns with the objectives of the Czech NQF Level 4, enabling learners to enhance their professional capabilities and contribute meaningfully to their chosen field.

Germany (DQR Level 4):

In Germany, the TwinRevolution course is aligned with the Deutscher Qualifikationsrahmen (DQR) Level 4. This level focuses on the development of specialized skills and knowledge within a specific vocational context. By

completing the course, participants gain the necessary competences to perform tasks autonomously and make informed decisions in their respective professional domains. This alignment demonstrates the course's relevance and suitability within the German qualifications framework.

Spain (MECU Level 4):

The TwinRevolution course corresponds to MECU Level 4 within the Spanish qualifications framework. At this level, learners acquire specialized knowledge and skills to work autonomously in their chosen field. The course equips participants with the necessary expertise to carry out complex tasks, contribute to innovative projects, and adapt to evolving industry demands. This alignment showcases the course's compatibility with the Spanish qualifications framework and its emphasis on practical application and independence.

By framing the TwinRevolution course at EQF Level 4, it aligns with the intermediate stage of qualifications and ensures that learners develop the necessary knowledge and competences to thrive in their professional endeavours. The course's alignment with the corresponding NQF levels in Finland, the Czech Republic, Germany, and Spain further reinforces its credibility and relevance within these national contexts, facilitating recognition and comparability of qualifications across different European countries.

TwinRevolution ECVET points

The following key points have been taken into consideration in the process of defining the ECVET credit points for the TwinRevolution training course:

- Project partners share the belief that ECVET points should be allocated to all units of learning outcomes within the qualification framework. Recording them in the personal transcript provides information about the scope of the learning outcomes achieved within the qualification.
- The successful acquisition of the whole qualification or its individual units of learning outcomes results in the awarding of the corresponding ECVET

points, regardless of the time taken or the training path used - whether it is formal training, non-formal training, or informal learning.

- Credit points can be utilized by trainees, individuals practicing a qualification without an official vocational qualification document, vocational education and training institutions, employers, and others to identify the individually acquired qualification.

- ECVET points support the trainee in acquiring the given qualification by mastering the units of learning outcomes that constitute it, in different countries and learning contexts (formal, non-formal, informal), while adhering to national legislation and complying with validation and recognition arrangements and regulations.

The total number of ECVET points is defined based on the duration of the training program in the formal education and training system. ECVET credits are transformed based on the assumption that 1 ECVET point equals one ECTS credit, and 1 ECTS credit equals 25 hours of total learning. This assumption is shared by the ECVET secretariat and most National Authorities[3]. It aligns with the system used in ECTS and Higher Education Qualifications, enhancing comparability and potential permeability. However, the allocation of hours for study, self-learning, training videos watching, and self-assessment may vary due to the diverse areas, fields, and final targets covered by vocational education and training (VET). Nevertheless, the quality assurance of the training materials and the endorsement of the Joint Curriculum will ensure the achievement of the expected results.

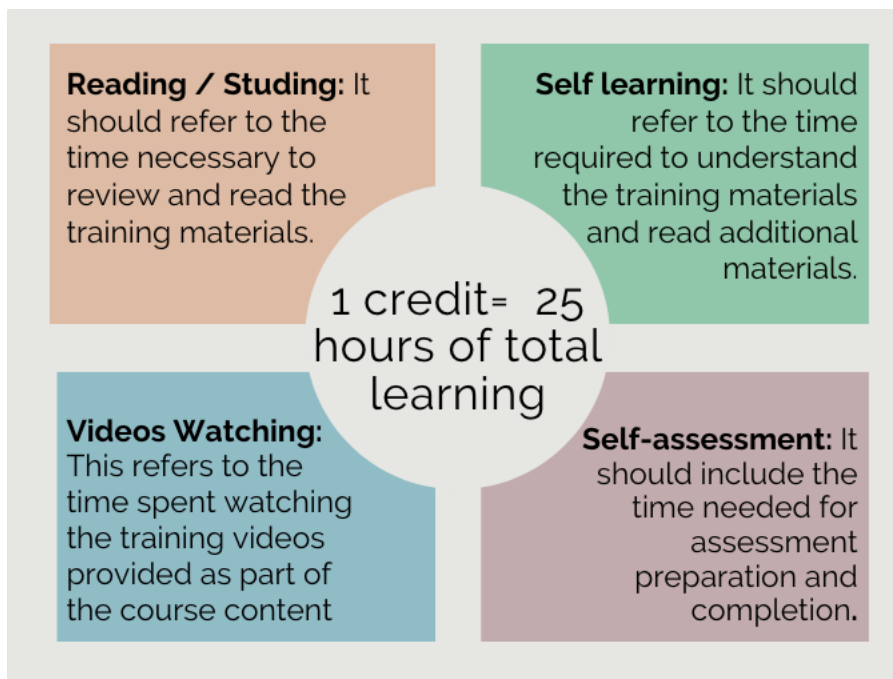[3] http://www.ecvet-secretariat.eu/en

Figure 2: ECVET definition in hours.

By considering the relative weight or duration of each unit and module, it becomes possible to estimate the corresponding ECVET points for each of them.

TWINREVOLUTION

EQF / NQF Level - 4

TRAINING MODULES	TRAINING LEARNING DURATION (HOURS)	RELATIVE WEIGHT IN THE FRAMES OF QUALIFICATION (IN%)	NUMBER OF ECVET POINTS
TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY	2,5	5	0,1
CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY	17	34	0,68
INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY	17	34	0,68
TWIN GREEN AND DIGITAL TRANSITION	13,5	27	0,54
TOTAL	50	100%	2

Figure 3: Relative weight and number of ECVET points per module.

Table 7: Structure of the Joint Curriculum. Hours & ECVET points.

	Structure of the Joint Curriculum	EQF/NQF	Reading Hours	Self learning (H)	Videos (H)	Assessment (H)	ToTal Hours	ECVET
MODULE 1	**TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY**		1	1				
LU1	Manufacturing Industry in transition	4	0,25	0,25				
LU2	Introduction to Industry 4.0	4	0,25	0,25	0,3	0,2	2,50	0,1
LU3	Introduction to Circular Economy	4	0,25	0,25				
LU4	Introduction to twin green & digital Transition	4	0,25	0,25				
MODULE 2	**CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY**		8	8				
LU5	Circular economy definitions	4	1	1				
LU6	Circular economy framework and principles	4	1	1				
LU7	Circular economy benefits and challenges	4	1	1	0,5	0,5	17	0,68
LU8	Strategies for the furniture sector (best practices and examples)	4	1,5	1,5				
LU9	Strategies for the textile sector	4	1,5	1,5				
LU10	Tools and processes (for the implementation of CE in the manufacturing Industry)	4	2	2				
MODULE 3	**INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY**		8	8				
LU11	Overview of I4.0 technologies	4	4	4				
LU12	Benefits and challenges of I4.0 technologies	4	2	2	0,5	0,5	17	0,68
LU13	Relevant I4.0 technologies in the Furniture sector	4	1	1				
LU14	Relevant I4.0 technologies in the textile sector	4	1	1				
MODULE 4	**TWIN GREEN AND DIGITAL TRANSITION**		6	6				
LU15	Twin green and digital transition in the life cycle chain. (Both sectors)	4	4	4				
LU16	Applications of twin green and digital transition in the furniture sector	4	1	1	1	0,5	13,5	0,54
LU17	Applications of twin green and digital transition in the textile sector	4	1	1				
							50,00	2

DEFINITION OF THE LEARNING UNITS

As previously mentioned, the TwinRevolution training course consists of four modules, each comprising a total of 17 units. Below, you will find a detailed description of these units, including their general contents, objectives, and learning outcomes in terms of knowledge, skills, and competences. It is important to note that all units are aligned with EQF level 4, which corresponds to NQF level 4 in the consortium countries. Additionally, the weighting of each module can be found in Figure 3, while Table 7 provides information on the duration of each individual unit.

MODULE 1	TWIN TRANSITION INITRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY		
EQF Level: 4	NQF Level: 4	Hours: 2,5	ECVET Points: 0.1
Assessment Methodology: Multiple choice / True or False questions			
Materials: Coursebook & Infographics & Videos			

Learning Unit 1: Manufacturing Industry in transition

Contents
1. What is the current state of play of manufacturing in the textile and furniture sector?
2. Where should we be heading in the furniture and textiles sector?
3. What steps should we take for the green and digital translation?

Objectives
1. Explain the current state of the manufacturing industry in the furniture and textile sector.
2. Explain the basic idea of a green and smart industry in the furniture and textile sector.

Knowledges
1. Understand the principles of the manufacturing hierarchy in the furniture and textile industries.
2. Understand which supporting principles can support the manufacturing industry in the transition.

Skills
1. Understand the limits of the manufacturing industry in the furniture and textile sector.
2. Recognize what dimensions need to be changed.

Competences
1. Explain the basic rationale of the transformation.

Learning Unit 2: Introduction to Industry 4.0.

Contents
1. Where are we now in Industry 4.0.
2. What technologies and tools are used in Industry 4.0.
3. Where Should We Go?

Objectives
1. Explain the basic concepts and technologies of Industry 4.0.

Knowledges
1. Understand the basic definitions of Industry 4.0.
2. Basic knowledge of technology and tools

Skills
1. Explain the benefits of Industry 4.0.

Competences
1. Understand what kind of tools are in Industry 4.0.

Learning Unit 3: Introduction to Circular Economy

Contents
1. The concept of circular economy and its current status.
2. What are the main points of the circular economy?
3. What are the barriers to the implementation of the circular economy?

Objectives
1. Explain the principle of the circular economy.
2. Explain the main pillars of the circular economy.
3. Explain some of the obstacles to the circular economy.

Knowledges
1. Understand the current situation of the circular economy.
2. Recognize what to focus on when introducing circular economy.
3. Understand and recognize key circulation strategies, tools and processes.

Skills
1. Know the appropriate circular strategies relevant to the textile and furniture industry.

Competences
1. Explain the basic principles of circular economy as an engine of transformation.

Learning Unit 4: Introduction to Twin Green & Digital Transition

Contents
1. Introduction to the basic principles and definitions of the Twin transition

2. Describe the link between the green and digital transition for the manufacturing industry.
3. Policy environment in the area of Twin -transition, policy framework, directives

Objectives
4. Explain the basic principle and definition of a twin transition.
5. Introduction of the framework policy and guidelines on twin transitions.

Knowledges
6. Understand how the basic principles twin transition for praxis.
7. Understand the link between the green and digital transition for the manufacturing industry.

Skills
1. Being able to select proper documents for company twin transition.

Competences
1. Understand how to use the relevant documents.

MODULE 2	CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY		
EQF Level: 4	NQF Level: 4	Hours: 17	ECVET Points: 0.68
Assessment Methodology: Multiple choice / True or False questions			
Materials: Coursebook & Infographics & Videos			

Learning Unit 5: Circular Economy Rationale and Definitions

Contents
1. Where We are Now: Limits to the Linear Economy
2. Where Should We Go: Doughnut Economics & The Sustainable Development Goals
3. How Do We Get There? Introducing the Circular Economy definition

Objectives
1. Explain our current economic model and how it has resulted in humanity living an unsustainable lifestyle.
2. Explain the core idea behind Doughnut Economics and the big picture it gives us for the future.
3. Explain the role the Sustainable Development Goals play in shaping a better future for all.
4. Explain the basic idea behind the Circular Economy.

Knowledges
1. Understand the limits to linear economy.

2. Recognize which dimensions need to change to develop a thriving society within planetary boundaries.
3. Comprehend how a circular economy can support this transformation.

Skills
1. Being able to form a system map of societal transformation needed to thrive within planetary boundaries.

Competences
1. Explain the basic rationale of circular economy as an engine of transformation.

Learning Unit 6: Circular Economy Framework and Principles

Contents
1. The Road to the CE: Three Principles
2. Operationalising the CE: R Frameworks

Objectives
1. Explain the core concepts behind the definition of the Circular Economy including the R-Framework/waste hierarchy, and systems perspective.
2. Understand the three principles on which the Circular Economy is based; design out waste and pollution, keep products and materials in use, and regenerate natural systems.

Knowledges
1. Name the underlying principles and frameworks defining a circular economy.
2. Understand the principles of the waste hierarchy.
3. Comprehend which enabling principles can support a circular economy.

Skills
1. Position your organization/sector within the butterfly diagramme

Competences
1. Choose the right strategy on the 9R framework that fits best your organization/sector

Learning Unit 7: Circular Economy Benefits and Challenges

Contents
1. What Do We Gain? Benefits of a Circular Economy
2. What is Stopping Us? Challenges to a Circular Economy
3. Breaking the Barriers - Everyone has a Role.

Objectives
1. Highlight the key benefits of the Circular Economy for the environment, the economy, and society.
2. Explain what the biggest barriers to implementing a Circular Economy are and how to cross them.
3. Share how anyone can contribute to a Circular Economy transition, no matter what their industry or role.

Knowledges
1. Name the key benefits of implementing a Circular Economy
2. Understand the cultural, technological, and economical challenges hindering the development of a circular economy.

Skills
1. Explain to colleagues the advantages of transitioning to a circular economy.

Competences
1. Systems thinking

Learning Unit 8: Circular Strategies for the Furniture Sector

Contents
1.1. Strategies for implementing circularity in the furniture sector.
    1.2. Materials innovation
    1.3. Ecodesign
    1.4. New business models
    1.5. End of life
1.2. Best practices from the industry

Objectives
1. Translate the key principles and strategies of circular economy in the furniture sector.

Knowledges
1. Understand which strategies can support Circular Economy in the furniture sector.
2. Connect with existing best practices from the industry.

Skills
1. Prioritize which strategies can be relevant for my organisation.

Competences
1. Select and understand how to implement the right strategy.

Learning Unit 9: Circular Strategies for the Textile Sector

Contents
1. Strategies for implementing circularity in the furniture sector.
    1.1. Materials innovation
    1.2. Ecodesign
    1.3. New business models
    1.4. End of life
2. Best practices from the industry

Objectives
1. Translate the key principles and strategies of circular economy in the furniture sector.

Knowledges
1. Understand which strategies can support Circular Economy in the textile sector.
2. Connect with existing best practices from the industry.

Skills
1. Prioritize which strategies can be relevant for my organisation.

Competences
1. Select and understand how to implement the right strategy.

Learning Unit 10: Tools and Processes for the Implementation of CE in the Manufacturing Industry

Contents
1. Overview of key tools and process to implement circularity.

Objectives
1. Get a better understanding of practical tools and processes supporting the implementation of circular economy in the manufacturing sector.

Knowledges
1. Name and understand the key steps to implement circularity.

Skills
1. Choose the right tools and methods to implement circularity.

Competences
1. Apply the right tools and methods.

MODULE 3	INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY		
EQF Level: 4	NQF Level: 4	Hours: 17	ECVET Points: 0.68
Assessment Methodology: Multiple choice / True or False questions			
Materials: Coursebook & Infographics & Videos			

Learning Unit 11: Overview of Industry 4.0 technologies

Contents
1. Industry 4.0 overview.
2. Industry 4.0 technologies.
    2.1. Internet of Things

twin
revolution

      2.2. Big Data & Analytics
      2.3. Simulation
      2.4. Robotic
      2.5. Additive Manufacturing
      2.6. Augmented and Virtual Reality
      2.7. System Integration
      2.8. Artificial Intelligence
3. Implementation of Industry 4.0: Technologies trends of Industry 4.0.

Objectives
1. Introducing Industry 4.0 and digital transformation.
2. Explain the main concepts and characteristics of Industry 4.0 technologies.
3. Explain Industry 4.0 technology trends.

Knowledges
1. Know general concepts about Industry 4.0 and digitalisation.
2. Obtain generic knowledge of Industry 4.0 technologies.
3. Know the technological trends of Industry 4.0.

Skills
1. Identify relevant Industry 4.0 technologies and their application in industry.

Competences
1. Analyse, compare and select relevant industry 4.0 technologies.

Learning Unit 12: Benefits and Challenges of Industry 4.0 Technologies

Contents
1. Introduction.
2. Benefits and challenges of Industry 4.0 technologies in manufacturing.
3. Use of Industry 4.0 technologies in sustainable manufacturing.

Objectives
1. Explain the benefits and challenges presented by Industry 4.0 technologies.
2. Explain the advantages of the application of Industry 4.0 technologies in manufacturing.
3. Introduce the use of Industry 4.0 technologies in sustainable manufacturing.

Knowledges
1. Understand the main benefits and challenges presented by Industry 4.0 technologies.
2. Recognise the advantages of Industry 4.0 technologies in manufacturing.
3. Basic knowledge of the use of Industry 4.0 technologies in sustainable manufacturing.

Skills

1. Be able to identify the uses of Industry 4.0 technologies in manufacturing.

Competences
1. Analyse, compare and select relevant Industry 4.0 technologies in manufacturing.

Learning Unit 13: Relevant Industry 4.0 Technologies in the Furniture Sector

Contents
1. Industry 4.0 in the furniture sector.
2. Main Industry 4.0 technologies in the furniture Industry.
3. Advantages and challenges of implementing Industry 4.0 technologies in the sustainable furniture industry.

Objectives
1. Explain the uses, benefits, and challenges of Industry 4.0 technologies for the sustainable furniture industry.

Knowledges
1. Understand the main benefits and challenges presented by Industry 4.0 technologies in the furniture industry.

Skills
1. Identify the uses of key enabling technologies in the furniture sector and in which areas could be applied.

Competences
1. Be able to select the most appropriate industry4.0 technologies to be implemented in a furniture organisation.

Learning Unit 14: Relevant I4.0 Technologies in the Textile Sector

Contents
1. Industry 4.0 in the textile sector.
2. Main I4.0 technologies in the textile Industry.
3. Advantages and challenges of implementing I4.0 technologies in the sustainable textile industry.

Objectives
1. Explain the uses, benefits, and challenges of Industry 4.0 technologies for the sustainable textile industry.

Knowledges
1. Understand the main benefits and challenges presented by Industry 4.0 technologies in the textile industry.

Skills
1. Identify the uses of key enabling technologies in the textile sector and in which areas could be applied.

Competences
1. Be able to select the most appropriate industry4.0 technologies to be implemented in a textile organisation.

MODULE 4	TWIN GREEN AND DIGITAL TRANSITION

EQF Level: 4	NQF Level: 4	Hours: 17	ECVET Points: 0.68

Assessment Methodology: Multiple choice / True or False questions

Materials: Coursebook & Infographics & Videos

Learning Unit 15: Twin Green and Digital Transition in the Life Cycle Chain

Contents
1. Industry 4.0 technologies that could be applied with sustainable purposes.
    1.1. Internet of things
    1.2. Big data & analytics
    1.3. Simulation
    1.4. Robotics
    1.5. Additive manufacturing
    1.6. Augmented and virtual reality
    1.7. System integration
    1.8. Artificial intelligence
2. Industry 4.0 technologies use in each life cycle step with sustainable purposes.
    2.1. Design
    2.2. Production
    2.3. Distribution
    2.4. Consumption, use, reuse, repair
    2.5. Waste collection
    2.6. Recycling

Objectives
1. Explain how industry 4.0 technologies could foster the circular economy transition and its sustainable benefits.
2. Highlight the technologies that could be used with circular economy purposes in each step of the manufacturing process/life cycle chain.

Knowledges
1. Describe the interconnections between green and digital transition for the manufacturing industry.

2. Name the most applied industry4.0 technologies that could foster the circular transition and their benefits.
3. Know the industry4.0 technologies that could be applied in the different manufacturing processes or life cycle steps with sustainable purposes.

Skills
1. Identify the suitable industry4.0 technologies to be applied in a particular manufacturing process to support a twin transition.
2. Be able to explain the benefits for a circular transition based upon the implementation of different industry4.0 technologies.

Competences
1. Choosing the industry4.0 technology that fits best in a particular life cycle step to boost a twin digital and green transition.

Learning Unit 16: Applications of Twin Green and Digital Transition in the Furniture Sector

Contents
1. Industry 4.0 technologies that could be applied with sustainable purposes in the furniture sector.
2. Best practices of furniture companies that applied industry 4.0 technologies to foster the twin digital and green transition.

Objectives
1. Offer examples of furniture companies that have applied industry 4.0 technologies to boost their twin digital and green transition.
2. Understand the benefits for a circular transition based on industry 4.0 technologies.

Knowledges
1. Understand which strategies can support Twin Digital and Green transition in the furniture sector.
2. Understand which industry 4.0 technologies can be applied, and in which processes, to boost the circular transition in a furniture organisation.
3. Connect with existing best practices from the furniture industry.

Skills
1. Prioritize which strategies can be relevant for a furniture organisation to boost a twin digital and green transition.

Competences
1. Select and understand how to implement the right industry 4.0 technology for a twin digital and green transition in a furniture organisation.

Learning Unit 17: Applications of Twin Green and Digital Transition in the Textile Sector

Contents
1. Industry 4.0 technologies that could be applied with sustainable purposes in the textile sector.
2. Best practices of textile companies that have applied industry 4.0 technologies to foster the twin digital and green transition.

Objectives
1. Offer examples of textile companies that have applied industry 4.0 technologies to boost their twin digital and green transition.
2. Understand the benefits for a circular transition based on industry 4.0 technologies.

Knowledges
1. Understand which strategies can support Twin Digital and Green transition in the textile sector.
2. Understand which industry 4.0 technologies can be applied, and in which processes, to boost the circular transition in a textile organisation.
3. Connect with existing best practices from the textile industry.

Skills
1. Prioritize which strategies can be relevant for a textile organisation to boost a twin digital and green transition.

Competences
1. Select and understand how to implement the right industry 4.0 technology for a twin digital and green transition in a textile organisation.

CONCLUSIONS

The TwinRevolution training course is structured into four distinct modules, each comprising a carefully designed set of units. This structuring ensures that the course fulfils all the necessary requirements outlined by the European Commission's ECVET and EQF recommendations. A comprehensive approach has been taken to describe the units and modules, focusing on the specific learning outcomes that encompass various aspects such as knowledge, skills, and competences.

To ensure appropriate credit allocation, a detailed assessment of the course has been conducted, taking into account the allocated time (measured in hours) for each unit and module. This evaluation process enables an accurate estimation of ECVET points for each individual unit, as well as for the modules as a whole. By aligning the TwinRevolution training course with EQF level 4, an extensive comparative analysis has been conducted between the National Qualification Frameworks of the consortium partners and the European Qualification Framework.

Based on this thorough analysis, it can be concluded that the TwinRevolution training course is deemed equivalent to EQF level 4. Moreover, it has been determined that the course will have a planned duration of 50 hours, which corresponds to a total of 2 ECVET points. This allocation of credits reflects the comprehensive nature of the course, the achievement of specific learning outcomes, and the successful attainment of the required competences and skills.

The structuring and alignment of the TwinRevolution training course with ECVET, European Qualification Frameworks, and the National Qualification Frameworks ensure its quality, relevance, and recognition both nationally and internationally. This robust framework provides learners with a solid foundation and facilitates their seamless progression within the European education and training systems.

Table 8: Structure of the complete Joint Curriculum.

Structure of the Joint Curriculum		Pathways			Pedagogical Approach	Materials	EQF/NQF	Reading Hours	Self learning (H)	Videos (H)	Assessment (H)	ToTal Hours	ECVET
		General	Furniture	Textile									
MODULE 1	TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY				Multiple choice / True or False	Coursebook / Videos / Infographic		1	1	0,3	0,2	2,50	0,1
LU1	Manufacturing Industry in transition	x	x	x			4	0,25	0,25				
LU2	Introduction to Industry 4.0	x	x	x			4	0,25	0,25				
LU3	Introduction to Circular Economy	x	x	x			4	0,25	0,25				
LU4	Introduction to twin green & digital Transition	x	x	x			4	0,25	0,25				
MODULE 2	CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY				Multiple choice / True or False	Coursebook / Videos / Infographic		8	8	0,5	0,5	17	0,68
LU5	Circular economy definitions	x	x	x			4	1	1				
LU6	Circular economy framework and principles	x	x	x			4	1	1				
LU7	Circular economy benefits and challenges	x	x	x			4	1	1				
LU8	Strategies for the furniture sector (best practices and examples)	x	x				4	1,5	1,5				
LU9	Strategies for the textile sector	x		x			4	1,5	1,5				
LU10	Tools and processes (for the implementation of CE in the manufacturing Industry)	x	x	x			4	2	2				
MODULE 3	INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY				Multiple choice / True or False	Coursebook / Videos / Infographic		8	8	0,5	0,5	17	0,68
LU11	Overview of I4.0 technologies	x	x	x			4	4	4				
LU12	Benefits and challenges of I4.0 technologies	x	x	x			4	2	2				
LU13	Relevant I4.0 technologies in the Furniture sector	x	x				4	1	1				
LU14	Relevant I4.0 technologies in the textile sector	x		x			4	1	1				
MODULE 4	TWIN GREEN AND DIGITAL TRANSITION				Multiple choice / True or False	Coursebook / Videos / Infographic		6	6	1	0,5	13,5	0,54
LU15	Twin green and digital transition in the life cycle chain. (Both sectors)	x	x	x			4	4	4				
LU16	Applications of twin green and digital transition in the furniture sector	x	x				4	1	1				
LU17	Applications of twin green and digital transition in the textile sector	x		x			4	1	1				
												50,00	2

REFERENCES

[1] Cedefop, "(2018). National qualifications framework developments in Europe 2017. Luxembourg: Publications Office.," [Online]. Available: http://data.europa.eu/doi/10.2801/029873. [Accessed 11 April 2023].

[2] M. D. E. Y. F. PROFESIONAL, "Catálogo Nacional de Cualificaciones Profesionales #FP," November 2022. [Online]. Available: https://incual.educacion.gob.es/documents/35348/80300/CNCP_listadoQ.pdf/67d33b4d-c885-49ba-8e07-15d433ba34a9. [Accessed 11 April 2023].

[3] M. d. E. y. F. Profesional., "Marco Español de Cualificaciones," [Online]. Available: https://www.educacionyfp.gob.es/mc/mecu/mecu.html. [Accessed 11 April 2023].

[4] N. Malhotra, ""Questionnaire design and scale development. The handbook of marketing research: Uses, misuses, and future advances".," 2006.

[5] C. (2018). "National qualifications framework developments in Europe 2017.," Luxembourg: Publications.

ANNEX

Memorandum of Understanding

TWIN revolution

Twin digital and green transition for furnitute and textile industries

Memorandum of Understanding

ECVET Validation and Recognition

Memorandum of Understanding

ECVET Validation and Recognition

TwinRevolution Project Info

Project Reference	*2021-2-DE02-KA220-VET-000050453*
Programme	Erasmus+ Partnerships for cooperation and exchanges of practices
Action type	Cooperation partnerships in vocational education and training
Project title	Supporting the twin digital and green transition on the manufacturing and traditional industry sectors through innovative VET resources.
Project starting date	01/04/2022
Project end date	31/07/2024
Project duration	28 months

May 2023

Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Table of Contents

Memorandum of Understanding

1. Objectives of the Memorandum of Understanding

The Memorandum of Understanding4 (MoU) forms the framework for cooperation between the competent institutions. It aims to establish mutual trust between the partners. In this Memorandum of Understanding partner organisations mutually accept their respective criteria and procedures for quality assurance, assessment, validation and recognition of knowledge, skills, and competence for the purpose of transferring credit.

2. Organisations signing the Memorandum of Understanding

Organisation 1 – Karlsruhe Institute of Technology	
Country	**Germany**
Name of the organisation	**Karlsruhe Institute of Technology - KIT**
Address	**Englerstraße 7, Bldg. 20.40, Room 118. 76131 Karlsruhe.**
Telephone	**+49 721 608 47313**
Website	**www.kit.edu**
Contac Person	**Name: Volker Koch**
	Position: Academic Councillor
E-mail	**Volker.koch@kit.edu**

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4 For more information and guidance on the establishment of a MoU please refer to the ECVET User's Guide: 'Using ECVET for geographical mobility (2012) - Part II of the ECVET Users' Guide - Revised version – including key points for quality assurance' – available at: https://www.cedefop.europa.eu/files/ECVET_USERS_GUIDE_PART-2-EN_update_2012.pdf

Country	Finland
Name of the organisation	Vaasan Yliopisto - UVA
Address	Wolffintie 32, 65200 Vaasa
Telephone	+358 29 449 8000
Website	www.uva.fi
Contac Person	Name: Arto Rajala
	Position: DEAN, School of Marketing and Communication, University of Vaasa
E-mail	arto.rajala@uwasa.fi

Organisation 3 – Centro tecnológico del mueble y la madera de la Región de Murcia

Country	Spain
Name of the organisation	Centro tecnológico del mueble y la madera de la Región de Murcia - CETEM
Address	Calle Perales S/N, 30510 Yecla, Spain
Telephone	+34 968 75 20 40
Website	www.cetem.es
Contac Person	Name: Josefina Garrido Lova
	Position: R&D director
E-mail	josefina.garrido@cetem.es

Organisation 4 – Textilni zkusebni ustav

Country	Czech Republic
Name of the organisation	Textilni zkusebni ustav - TZU
Address	Cejl 480/12, CZ-602 00 Brno
Telephone	+420 543 42 67 35
Website	www.tzu.cz
Contac Person	Name: Vitezslav Gaja

	Position: Deputy director
E-mail	gaja@tzu.cz

	Organisation 5 – IES José Luis Castillo-Puche
Country	Spain
Name of the organisation	**IES José Luis Castillo-Puche - JLCP**
Address	**C. Játiva, 2, 30510 Yecla. Spain**
Telephone	**+34 968 79 06 80**
Website	**www.iescastillopuche.es**
Contac Person	**Name: Rafael Ruz Muñoz**
	Position: *Head of studies VET*
E-mail	**rafael.ruz@murciaeduca.es**

3. Qualification covered by this MoU

Qualification

Training modality	**Online non formal training**
Title of qualification	**TwinRevolution Training Course**
EQF level	**4**
Units of learning outcomes	**4 modules	17 Learning Units**
ECVET	**2**
Enclosures in annex	**Joint Curriculum**

4. Assessment, documentation, validation, and recognition

By signing this Memorandum of Understanding we confirm that we have discussed the procedures for assessment, documentation, validation, and recognition and agree on how it is done.

5. Validity of this Memorandum of Understanding

6. Signatures

Karlsruhe Institute of Technology

Name, role	**Place, date**
Volker Koch	Karlsruhe, 15.05.2023
Academic Councillor	

Signature

[handwritten signature: Koch]

Stamp

∆KIT
Karlsruher Institut für Technologie
Institut Entwerfen und Bautechnik
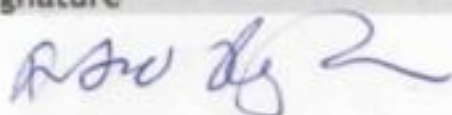Professur Building Lifecycle Management

Vaasan Yliopisto

Name, role	Place, date
Arto Rajala	Vaasa, 15.05.2023
DEAN, School of Marketing and Communication, University of Vaasa	

Signature

Stamp

Centro tecnológico del mueble y la madera de la Región de Murcia

Name, role	Place, date
Josefina Garrido Lova	Yecla, 15.05.2023
R&D director	

Signature

Stamp

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Textilni zkusebni ustav

Name, role	Place, date
Vitezslav Gaja	Brno, 15.05.2023
Deputy director	

Signature

Stamp

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ústav
Cejl 480/12 602 00 Brno

IES José Luis Castillo-Puche

Name, role	Place, date
Rafael Ruz Muñoz Head of studies VET	Yecla, 15.05.2023

Signature

Stamp

7. Annexes

Joint Curriculum & Definition of the Learning Units

Structure of the Joint Curriculum		Pathways			EQF/NQF	ToTal Hours
		General	Furniture	Textile		
MODULE 1	**TWIN TRANSITION INTRODUCTION: TOWARDS A GREEN AND SMART MANUFACTURING INDUSTRY**					2,50
LU1	Manufacturing Industry in transition.	x	x	x	4	
LU2	Introduction to Industry 4.0.	x	x	x	4	
LU3	Introduction to Circular Economy	x	x	x	4	
LU4	Introduction to twin green & digital Transition	x	x	x	4	
MODULE 2	**CIRCULAR ECONOMY APPLIED IN THE MANUFACTURING INDUSTRY**					17
LU5	Circular economy definitions	x	x	x	4	
LU6	Circular economy framework and principles	x	x	x	4	
LU7	Circular economy benefits and challenges	x	x	x	4	
LU8	Strategies for the furniture sector (best practices and examples)	x	x		4	
LU9	Strategies for the textile sector	x		x	4	
LU10	Tools and processes (for the implementation of CE in the manufacturing Industry) – Practical.	x	x	x	4	
MODULE 3	**INDUSTRY 4.0 TECHNOLOGIES IN THE MANUFACTURING INDUSTRY**					17
LU11	Overview of I4.0 technologies	x	x	x	4	
LU12	Benefits and challenges of I4.0 technologies	x	x	x	4	
LU13	Relevant I4.0 technologies in the Furniture sector	x	x		4	
LU14	Relevant I4.0 technologies in the textile sector	x		x	4	
MODULE 4	**TWIN GREEN AND DIGITAL TRANSITION**					13,5
LU15	Twin green and digital transition in the life cycle chain. (Both sectors)	x	x	x	4	
LU16	Applications of twin and digital transition in the furniture sector	x	x		4	
LU17	Applications of twin and digital transition in the textile sector	x		x	4	
						50,00

Twin digital and green
transition for furniture
and textile industries