Web-based VET modules in the energy efficiency of intelligent buildings for electricians: EE-VET

Project ID: 2021-1-DE02-KA220-VET-000029591

Open Source EE-VET Results for Reusing in Micro-courses

Sustainability Report

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1 Introduction

1.1 Aim of the project

To help fight climate change, the EU has set ambitious targets to reduce its greenhouse gas emissions. The EU wants to reach climate neutrality by 2050 and this target, along with an interim target of 55% CO2 emission reduction by 2030, are set in the European Climate Law.
The common goal of EE-VET project was to overcome the current lack of electrical engineering skills for energy efficiency for energy production and to create and implement training adequate to the demand in the human resources market in Europe:

- Responses to the growing demand for new electricians working with solar installations in the current construction industry in the five partner countries.
- To allow unemployed or active workers to improve their skills in installing and maintaining solar installations, respectively.
- Strengthening the exchange of knowledge and practices between education and training institutions and the labor market in this professional field.

The objectives to achieve the long term aims of the project were as follows:

- to develop up-to-date professional training on the energy efficiency of building electrical installations.
- to train qualified specialists who will be able to apply modern technological solutions, leading to a reduction of energy consumption of buildings and reduction of CO2 emissions.
- to improve the digital competencies of both learners and their trainers. The training modules will be provided as open educational resources.

1.2 Target groups

- Vocational Training institutes providing training in PV energy installation field.
- Unemployed electricians, electrical installers.
- Specialized trainers of vocational courses in the PV sector.
- Companies engaged in the PV sector.
- Employed electricians willing to upgrade their skills.
- Training centers for adults and continuous training.
- Policy makers in the field of education and training.
- Unemployed youngsters with lower secondary educational attainment.

1.3 Methodology

A demand-oriented vocational and educational training was developed in response to the objectives set by EU Directive 2010/31 / EU on energy-efficient buildings: all new buildings by 2020 should be nearly zero energy. The Consortium developed three innovative training modules for improving the competencies of electrical engineers in the installation and maintenance of energy-efficient technical solutions in buildings and will increase the quality of VET in three main areas: -

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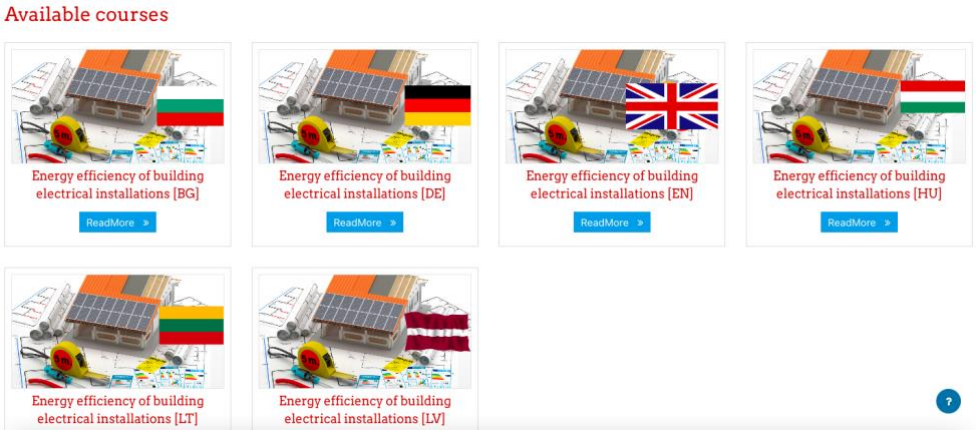
1. MODULE 1: Checking, maintaining, and adjusting the energy-efficient modes of operation of modern automated BMS (Building Management Systems)
2. MODULE 2: Energy efficient lighting technologies in buildings.
3. MODULE 3: Photovoltaic System

The training modules were developed in all six languages of the project consortium (German, Hungarian, Latvian, Lithuanian, Bulgarian and English).



The modules were implemented in a web-based learning environment based on the Moodle learning management system, in the form of e-learning courses with multimedia resources, digital assessments and interactive materials.

The implementation was based on the "lesson" course component what is an interactive component in Moodle. The course participants scan progress step by step through the curriculum. The teacher creates a series of pages or steps that may include text, pictures, videos or other multimedia elements. These pages or steps must be followed by the students in a sequence determined by the teacher. They can increase engagement and ensure understanding by including a variety of questions, such as multiple choice, matching and short answer. Depending on the student's choice of answer and how the teacher develops the lesson, students may progress to the next page, be taken back to a previous page or redirected down a different path entirely. The settings for each Moodle installation and course may vary, so details on how to use the 'lesson' will depend on the specific Moodle system and course settings.

In addition, providing relevant and high-quality knowledge in the field, the innovative e-learning environment was also designed to develop the digital competences of learners and their trainers. The open access learning content in the e-learning environment offers flexible learning opportunities for target groups without time and space constraints.

The e-learning platform available on the URL: https://ee-vet.rta.lv/

Responsible partner to ask account: Rezeknes Tehnologiju Akademija (Latvia)

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2 Open access to the content and EE-VET course

The open-source content is freely available for all European students, teachers and trainers in higher and vocational education on the e-learning platform developed by Latvian university RTA.
The **visitors** of the website get access to the content as guests (without registration), but after registering they can join to the course with all interactive learning opportunities, like lessons, quizzes, glossaries.

The e-learning platform available on the URL: https://ee-vet.rta.lv/

Responsible partner to ask account: Rezeknes Tehnologiju Akademija (Latvia)

This platform is the main reusable result what makes the project outcomes sustainable, however the partnership elaborated further methodology providing more opportunities for utilizing the comprehensive learning content.

2.1 Indicators

The indicators of the learning content developed in English and translated into the national languages of the partners (BG, DE, HU, LT, LV) by the partnership are as follows:
Number of modules: 3
Number of topics: 92 (an average of 3-5/pages in each topics)
Glossary entries: 361
Quiz questions: 144
Estimated duration of the whole course (for VET students of EQF 4): 8 weeks

Number of	1.Building Management Systems	2.Energy efficient lighting technologies in buildings.	3.Photovoltaic System	Total
topics	70	44	51	**165**
entries in the glossary	131	15	215	**361**
questions in quizzes	49	45	50	**144**
Duration (weeks)	3	3	3	**12**

Indicators of EE-VET course with 3 modules

2.2 Open access to the learning material

The English version of the learning content is available in all over Europe to reuse in any form of education, and any form of courses, free to translate, modify and remix. It is uploaded to Erasmus+ dissemination platform.

2.3 Open access to the e-learning course

On the e-learning platform there are different level of accounts:

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(1) Open access for guest users

Visitors, without registration can enter as Guest user, and can access to all learning materials, can browse, copy all contents in the modules in all languages. However, with this account the user cannot carry on any kind of interactivity (like doing assignments, commenting on forums), to improve the content against illegal intentional and even unintentional damage.

(2) Sharing the whole Moodle courses openly

We will use the Moodle functionality for exporting whole courses to reuse them in any other Moodle platform. European educational institutions or teachers, trainers, professors who want to reuse EE-VET courses, can send an e-mail directly through the e-learning platform and ask the system administrator to create and share the exported files.

The role's functions are clarified on the opening page of the course. During the next 5 years the experts of the project partners will be responsible for the national versions of the content:

Bulgaria: Plamen Tsankov (Gabrovo University)

Latvia: Lyubomir Lazov (Rezekne University)

Germany: Karl Schmid (Social CRM Research Center e.V)

Lithuania: Zivile Satiene

Hungary: Mária Hartyányi (iTStudy Hungary Ltd.)

3 Reusing EE-VET results in line with EU recommendation

EE-VET partnership decided to utilize the results of the project by offering micro-courses from the 3 modules, adapting, or selecting a part of the content to the learning needs of the actual target group.
This concept is aligned with the recommendation of the European Union asking the educators offer more flexible learning options in the form of micro-courses.

3.1 Micro-courses by reusing EE-VET modules

An essential milestone in the modernization of vocational education and training has been the introduction of modular training programs. The modular system offers a more adaptable learning pathway compared to traditional subject-based programs however, it falls short when it comes to rapidly equipping graduates with the knowledge and skills necessary to effectively utilize the latest workplace technologies. This constant need for knowledge and skill renewal, coupled with the demand for lifelong learning, has given rise to a novel training approach known as 'micro-courses.'
At the same time companies often encounter difficulty in finding individuals proficient in handling cutting-edge technologies and discover a lack of suitable courses in the educational market that can quickly bridge the knowledge and skills gap.
In parallel with the spread of micro-courses, there has been a demand from young and adult citizens who participate in short-cycle, so-called "upskilling" courses, to find out how the knowledge and skills acquired can be officially recognised, how they can formally enrich their own professional portfolio with the

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learning outcomes of micro-courses. They are looking for ways to use the learning outcomes of such micro-courses to formally enhance their professional portfolio.
For designing micro-courses, we applied the recommendation of the Council of the European Union published in 2022. It describes the conditions that must be met before a trainer can certify learning outcomes after a short cycle of training by issuing an officially recognised "micro-credentials".
According to the recommendation a "micro-credential" is a formal document that validates the learning outcomes achieved by a learner upon completing discrete units of learning and assessed by transparent and well-defined criteria. The purpose of micro-credentials is to furnish learners with specific knowledge, skills, and competences that align with social, personal, cultural, or labour market demands. Importantly, micro-credentials are the property of the learner and can be easily shared and carried.
The document does not define the requirements for a syllabus of the micro-course leading to micro-credentials, gives recommendation for the mandatory and optional elements of the micro-credential:

- the workload required to obtain the certificate (in ECTS credits[1], if possible);
- description of learning outcomes;
- the level of learning experience required to obtain the certificate, according to the EQF or the Framework for Higher Education (QF-EHEA);
- the method and type of evaluation;
- the form of participation in the training (type of training);
- the quality assurance procedures used to support the certificate;
- the prior knowledge required for enrolment.

Most of these are well known from the VET frameworks and programmes, except for the description of workload in credits, which is already used in higher education.
Annex I of the Recommendation includes the form for the content of micro-certificates issued in the EU as follows:

Compulsory elements:	Identification of the learner
	Name of the micro-credential
	Country(ies)/region(s) of issuer
	Awarding body(ies)
	Date of issuing
	Learning outcomes
	Notional workload needed to achieve the learning outcomes (in ECTS credits where possible)
	Level (and, where applicable, cycle) of learning experience leading to the micro-credential (EQF, European Higher Education Area Qualifications Framework)
	Type of assessment
	Form of participation in the learning activity
	Type of quality assurance used to underpin the micro-credential
	Pre-requisites needed to enrol in the learning activity

[1] ECTS is the acronym for European Credit **Transfer** and Accumulation System.

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Optional elements, where applicable (non-exhaustive list)	Supervision and identity verification during assessment (unsupervised with no identity verification, supervised with no identity verification, supervised online, or onsite with identity verification)
	Grade achieved
	Integration/stackability options (stand-alone, independent micro-credential/integrated, stackable towards another credential)
	Further information

3.2 Template for planning micro-courses

The Consortium developed a template for planning micro-courses built up from EE-VET modules by integrating the EU recommendation so that the partners who will be a micro-credentials provider[2] should be able to submit a micro-certificate (micro-credential) in line with the EU standard.

Template for designing micro-course	
Data	**Description**
Title of the micro-course	
Target group:	
EQF Level:	
The aim of the micro-course	A few sentences of information for students on why to join the course
Previous studies/learning experience - entry requirements	List of prerequisites for successful completion: previously completed microcourses/pre-requisites/competences.
Learning outcome	Learning outcomes (desribed in terms of knowledge, skills and responsibility and autonomy) according to the EQF issued by the EU or the NQF adapted by the partner country.
Digital competences	Aligned with DigComp 2.2
List of topics covered in the training	Title of the topic and its weight inside the course
Responsibilities (tasks) of participants	
Duration of the course:	
Number of contact hours of attendance	
Number of online contact hours	

[2] "Micro-credentials providers" encompass a wide array of stakeholders, including educational and training institutions and organizations, social partners (representing both workers and employers), employers and industry representatives, civil society organizations, public employment services, regional and national authorities, and other entities involved in developing, offering, and issuing micro-credentials for the formal recognition of learning acquired through formal, non-formal, and informal means. It is crucial to note that this is subject to regional and national legislation and circumstances (Council Recommendation, 2022).

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Template for designing micro-course	
Data	**Description**
Estimated workload	
Average time spent on individual tasks	
(Average) time needed for individual learning	
ECTS/ECVET credits	
Performance assessment	Tests, exam, essay, etc, practical/theoratical examination
Assessment	

Based on the templates the partners developed their own plans for delivering micro-courses after the project closure, reuse all the materials in each partner country in Bulgaria, Germany, Hungary, Latvia, and in Litvania.

4 EE-VET micro-courses in partner countries

4.1 Bulgaria: European Center for Education, Science and Innovation

Example

Title of the micro-course:	Energy efficient lighting technologies in buildings
Target group	Designers of electrical and lighting installations in buildings
Provider	European Center for Education, Science and Innovation
EQF level	6
ECTS credits	2

The aim of the micro-course

A few sentences of information for students on why to join the course

Learners will acquire knowledge and skills for a correct choice of lamps and luminaires, and work with a specialized software for the design of modern lighting systems in buildings, according to the latest European standards. They will get acquainted with lighting fundamentals, light quantities, electrical and colour characteristics of modern light sources, photobiological effects of light on humans, parameters and characteristics of the modern types of lamps and luminaires, lighting control and protection devices, indoor lighting design and maintenance recommendations used in energy-efficient lighting systems for residential and office buildings.

Previous studies/learning experience - entry requirements

List of prerequisites for successful completion: previously completed microcourses/pre-requisites/competences.

Bachelor or Master degree in electrical engineering

Learning outcome

Learning outcomes according to the EQF issued by the EU or the NQF adapted by the partner country

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Knowledge	Skill	Responsibility and autonomy
Lighting fundamentals, light quantities, electrical and colour characteristics of modern light sources, photobiological effects of light on humans, parameters and characteristics of the modern types of lamps and luminaires, lighting control and protection devices	Correct choice of lamps and luminaires depending on the specific application. Recongizing the energy efficiency level and photobiological safety of the light sources.	Working independently without guidance and taking responsibility for the result.
Specialized lighting design software functionalities	Software calculation of quantitative and qualitative indicators of indoor lighting systems, according to the latest European standards.	

Digital competences to be acquired according to DigComp 2.2:

The participants will be able to collaborate online with other workers and to use special application for planning systems.

List of topics covered in the training

Title of the topic	Weight (%)
Lighting fundamentals	20
Lamps	20
Luminaires	10
Lighting control and protection	10
Indoor lighting design and maintenance	20
Photovoltaic (PV-LED) systems for lighting	10
Course project on lighting design	10

Form of participation, tasks of participants

Duration of the course: 2 weeks

Number of contact hours of attendance: 0

Number of online contact hours : 30 (2 weeks - 10 days x 3 evening hours online)

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Estimated workload (hours)

Average time spent on individual tasks:	30
(Average) time needed for individual learning:	30
Total:	60

Tasks of participants

Topic	**Weight**
Task 1: Quiz (theoretical)	50%
Task 2: Course project report on lighting design (practical)	50%

Assessment methodology, threshold, certificate

Presentation of assessment methods (tests, exercises)

Methods	The assessment will be based on the evaluation of the assignments and the level reached in the online test. The activities and the assignments will be evaluated by the tutor
Threshold for success	<60%
Successfully completed	60%-80%
Excellently completed	>80%

Certificate

This will be the name of the institution on the certificate issued jointly by the school, the company and the consortium and given to the students.

Certificate for specialized qualification in the design of lighting systems from the Postgraduate Qualification Center of the Technical University of Gabrovo

Resources

Human resources

Position	**Posted on**	**Person(s)**
Professional (author, expert of the field)	Supervises learning activities, is responsible for the professional quality of the micro-course, supports teachers' activities.	**Manager** from the Postgraduate Qualification Center of the Technical University of Gabrovo

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Teachers, trainers (lecturer)	Prepares learning materials, conducts lessons, monitors participants' learning, completes independent tasks, assesses learning outcomes, liaises with the professional supervisor and reports on progress.	**Lecturer** - PhD in Electrical or Lighting engineering **Trainer for practice/project** - MSc in electrical engineering
Education officer	Carry out administrative tasks related to training.	**Technical Secretary** of the Center for Postgraduate Qualification of the Technical University of Gabrovo

Learning environment

Presentation of the online learning environment supporting collaboration, availability of learning materials. Describe the technical means used to support the accessibility of the learning material after the end of the micro-course (e.g. "A video recording of the contact hours will be made available at....").

Computer with Internet connection, covering the minimum hardware requirements for DIALux / Relux software: at least 4 GB of RAM , recommend 8 to 16 GB for the professional use; graphics card should support OpenGL 3.2 with a memory at least 1 GB, 2 GB+ is recommended.

List of digital (free and self-made) educational content

Study material	**Format, contact details**	**Creator**
Energy efficient lighting technologies in buildings	Moodle, Module 2 lessons at https://ee-vet.rta.lv	Plamen Tsankov

Technical conditions

Tools provided by the trainer to join the microcourse

Moodle registration credentials for the microcourse, Course project assignment

Other conditions for the implementation of the microcourse

Links for downloading of:
Guide for coursework in lighting and installation technology
Manual for laboratory exercises in Lighting and installation technology

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4.2 Germany: Social CRM Research Center e.V.?

Example

Title of the micro-course:	Introduction into the world of Building Management Systems (BMS)
Target group	Employed Electricians
EQF level	3-4
Micro-course provider	Social CRM Research Center e.V.

The aim of the micro-course

A few sentences of information for students on why to join the course

The course should upgrade the skills of the target group in the field of Building Management Systems.

The course will end with an examination and a certificate.

Previous studies/learning experience - entry requirements

List of prerequisites for successful completion: previously completed micro-courses/pre-requisites/competences.

Education as a professional electrician

Learning outcome

Learning outcomes according to the EQF issued by the EU or the NQF adapted by the partner country

Knowledge	Skill	Responsibility and autonomy
structure of needs and requirements	measurement of energy consumptions measurement of temperature ranges	description of needs and requirements
knowhow about BMS components and their functions	Selection of Components Combine and Connect the components	Student will be able to setup a BMS according to the requirements

Digital competences to be acquired according to DigComp 2.2

Basic digital skills

List of topics covered in the training

Title of the topic	Weight (%)
Types of components	33
Connection of components	33

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Title of the topic	Weight (%)
Installation of components	33

Form of participation, tasks of participants

Duration of the course: 2 weeks

Number of contact hours of attendance: 8
Number of online contact hours :16

Estimated workload

Average time spent on individual tasks:	16
(Average) time needed for individual learning:	24
Total:	40

Estimated credits available (ECVET): not relevant

Tasks of participants

Topic	Weight
Task 1: quiz	50
Task 2: final assessment	50

Assessment methodology, threshold, certificate

Presentation of assessment methods (tests, exercises)

Methods	The assessment will be based on the evaluation of the assignments and the level reached in the online test. The activities and the assignments will be evaluated by the tutor
Threshold for success	<60%
Successfully completed	60%-80%
Excellently completed	>80%

Certificate

This will be the name of the institution on the certificate issued jointly by the school, the company and the consortium and given to the students.

Social CRM Research Center e.V.

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Resources

Human resources

Position	Posted on	Person(s)
Professional Manager(s)	Supervises learning activities, is responsible for the professional quality of the micro-course, supports teachers' activities.	Karl Schmid Cristina Barahona
Teachers, trainers	Prepares learning materials, conducts lessons, monitors participants' learning, completes independent tasks, assesses learning outcomes, liaises with the professional supervisor and reports on progress.	Ivan Spinoza Tejas Mate
Education officer	Carry out administrative tasks related to training.	Annemarie Hohbach

Learning environment

Presentation of the online learning environment supporting collaboration, availability of learning materials. Describe the technical means used to support the accessibility of the learning material after the end of the micro-course (e.g. "A video recording of the contact hours will be made available at....").

Moodle for Learning and Testing, Power Point and Word for reporting

List of digital (free and self-made) educational content

Study material	Format, contact details	Creator
Online Modules	Moodle	SCRC
Overview Learning Content	Power Point	SCRC CBA
Test	Moodle / Multiple Choice	SCRC

Technical conditions

Tools provided by the trainer to join the microcourse

Access to Moodle, Power Point (Module overview)

Other conditions for the implementation of the course

A short, attention-grabbing summary for those who may find the micro-course useful in the future.

Quality assurance

Survey regarding the quality of teaching material - filled out by students

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4.3 Latvia: Rezekne Academy of Technologies

Example

Title of the micro-course:	Safety during the installation of PV systems
Target group	Professional training of learners in the photovoltaic industry
EQF level	6
Training provider	Rezekne Academy of Technologies

The aim of the micro-course

The aim is to discuss all the key safety issues affecting the process of installing and operating photovoltaic systems

Previous studies/learning experience - entry requirements

- To be familiar with the basic principles of photovoltaic technology.
- To know the main components included in the architecture of a photovoltaic system.
- To be familiar with the functional capabilities and characteristics of the individual elements of the photovoltaic system.

Have basic knowledge in the field of electrical engineering.

Learning outcome

Learning outcomes according to the EQF issued by the EU or the NQF adapted by the partner country

Knowledge	Skill	Responsibility and independence
Basic knowledge of safe working conditions when installing photovoltaic installations.	The learner will be able to choose the correct methodology and sequence of operational activities necessary to ensure safe conditions during the installation, monitoring and service activity of the PV system.	The installer of the PV system can carry out installation activities independently, but regular company supervision by an authorized person responsible for safe working conditions is mandatory.
Knowledge of important nationality documents and standards at national and European level related to safe working conditions in energy and construction.	Skills for working with personal protective equipment and strict compliance with instructions for working with electrical equipment according to international and national regulatory rules.	

List of topics covered in the training

Title of the topic	Weight (%)

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Safety rules during installation and maintenance of photovoltaic systems - Introduction	20
Types of risks associated with working with photovoltaic installations.	20
Safe rules for construction work at heights and installation of PV systems on roof structures	20
Safety rules when installing electrical equipment/plants/photovoltaic systems.	20
Risk prevention measures - organizational and technical	10
Personal protective equipment for photovoltaic workers	10

Form of participation, tasks of participants

Duration of the course: x weeks

Number of contact hours of attendance: 8
Number of online contact hours : 8

Estimated workload

Average time spent on individual tasks:	16
(Average) time needed for individual learning:	24
Total:	40

Estimated credits available (ECVET): 1??

Tasks of participants

Topic	**Weight**
Task 1: quiz	50
Task 2: final assessment	50

Assessment methodology, threshold, certificate

Presentation of assessment methods (tests, exercises)

Methods	The assessment will be based on the evaluation of the assignments and the level reached in the online test. The activities and the assignments will be evaluated by the tutor
Threshold for success	<60%
Successfully completed	60%-80%

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Excellently completed	>80%

Certificate

This will be the name of the institution on the certificate issued jointly by the school, the company and the consortium and given to the students.

Rezekne Academy of Technologies, lifelong learning center

Resources

Human resources

Position	Posted on	Person(s)
Professional Manager(s)	Supervises learning activities, is responsible for the professional quality of the micro-course, supports teachers' activities.	Head of the Postgraduate Qualification Center of Rezekne Academy of Technologies
Teachers, trainers	Prepares learning materials, conducts lessons, monitors participants' learning, completes independent tasks, assesses learning outcomes, liaises with the professional supervisor and reports on progress.	Teacher - doctor of electrical engineering
Education officer	Carry out administrative tasks related to training.	Practice/Project Trainer - Master of Electrical Engineering

Learning environment

Presentation of the online learning environment supporting collaboration, availability of learning materials. Describe the technical means used to support the accessibility of the learning material after the end of the micro-course (e.g. "A video recording of the contact hours will be made available at....").

Computer with Internet connection, covering the minimum hardware requirements for DIALux / Relux software: at least 4 GB of RAM , recommend 8 to 16 GB for the professional use; graphics card should support OpenGL 3.2 with a memory at least 1 GB, 2 GB+ is recommended.

List of digital (free and self-made) educational content

Study material	Format, contact details	Creator
Photovoltaic technologies	Moodle, module 3 lessons at https://ee-vet.rta.lv	Lyubomir Lazov

Technical conditions

Tools provided by the trainer to join the microcourse

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Moodle registration credentials for the microcourse

Other conditions for the implementation of the microcourse

List of other documents, learning guides, links to resources available online, learning environment, etc.

Access to Moodle, Power Point
A short, attention-grabbing summary for those who may find the micro-course useful in the future

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4.4 Lithuania: Alytus Vocational Training Centre (AVTC)

Title of the micro-course:	Installation of PV modules
Target group	Employed Electricians
EQF level	4
Training provider	Alytus Vocational Training Centre (AVTC)

The aim of the micro-course

Graduated adults or workers, who want to gain additional skills or get another education/retraining

Previous studies/learning experience - entry requirements

Education as a professional electrician.

Learning outcome

Learning outcomes according to the EQF issued by the EU or the NQF adapted by the partner country

Knowledge	Skill	Responsibility and independence
Basic knowledge of generating electricity by using PV modules. Knowing important parameters needed for increasing the efficiency of PV modules	A student will be able to choose the right materials, necessary to install PV modules and generate electrical power efficiently.	Safely connect PV systems
Knowledge of important nationality documents and standards at national and European level related to safe working conditions in energy and construction.	Skills for working with personal protective equipment and strict compliance with instructions for working with electrical equipment according to international and national regulatory rules.	Independent evaluation and use of documents

Digital competences to be acquired according to DigComp 2.2

Basic digital skills

List of topics covered in the training

Title of the topic	Weight (%)
	20
	20

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	20
	20
	10
	10

Form of participation, tasks of participants

Duration of the course: 3 weeks

Number of contact hours of attendance: 16
Number of online contact hours : 24

Estimated workload

Average time spent on individual tasks:	16
(Average) time needed for individual learning:	24
Total:	40

Estimated credits available (ECVET): 1??

Tasks of participants

Topic	**Weight**
Task 1: quiz	50
Task 2: final assessment	50

Assessment methodology, threshold, certificate

Presentation of assessment methods (tests, exercises)

Methods	The assessment will be based on the evaluation of the assignments and the level reached in the online test. The activities and the assignments will be evaluated by the tutor
Threshold for success	<60%
Successfully completed	60%-80%
Excellently completed	>80%

Certificate

This will be the name of the institution on the certificate issued jointly by the school, the company and the consortium and given to the students: Alytus Vocational Training Centre (AVTC)

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Alytaus Vovation training centre

Resources

Human resources

Position	Posted on	Person(s)
Professional Manager(s)	Supervises learning activities, is responsible for the professional quality of the micro-course, supports teachers' activities.	Person responsable of the Postgraduate Qualification
Teachers, trainers	Prepares learning materials, conducts lessons, monitors participants' learning, completes independent tasks, assesses learning outcomes, liaises with the professional supervisor and reports on progress.	Teacher - of electrical engineering
Education officer	Carry out administrative tasks related to training.	Practice/Project Trainer - Master of Electrical Engineering

Learning environment

Presentation of the online learning environment supporting collaboration, availability of learning materials. Describe the technical means used to support the accessibility of the learning material after the end of the micro-course (e.g. "A video recording of the contact hours will be made available at....").

Computer with Internet connection, covering the minimum hardware requirements for DIALux / Relux software: at least 4 GB of RAM , recommend 8 to 16 GB for the professional use; graphics card should support OpenGL 3.2 with a memory at least 1 GB, 2 GB+ is recommended.

List of digital (free and self-made) educational content

Study material	Format, contact details	Creator
Photovoltaic technologies	Moodle, module 3 lessons at https://ee-vet.rta.lv	Lyubomir Lazov

Technical conditions

Tools provided by the trainer to join the microcourse

Moodle registration credentials for the microcourse

Other conditions for the implementation of the microcourse

List of other documents, learning guides, links to resources available online, learning environment, etc.

Access to Moodle, Power Point
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5 Certificate - template

TITLE of the MICRO-COURSE

EQF LEVEL XX

Type of the training: blended/face-to-face/online

to

NAME

(maiden name: xxxxxxxxxxxxxx, POB: place, DOB: date, mother's name: xxxxx)
for completing successfuly the course in COUNTRY, REGION
Month Day, Year - Month Day, Year

The holder of the certificate achieved the learning outcomes of the course

- ✓ Learning Outcome 1,
- ✓ Learning Outcome 2,
- ✓ ...
- ✓ ...

by performing the requirements of the assessment (e.g. final online test and elaborating the project plan).

The issuer of the certificate applied the quality management defined by its internal QMS system.

Place&Date

STEMP, and signal

NamePosition, Official name of Awarding Body

The course was developed by using the results of the Erasmus+ project of EE-VET Improving the efficiency and attractiveness of vocational education/training of electricians (2024).

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6 Annexes

6.1 Bibliography

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Council Recommendation (22 May 2017) repealing the Recommendation of the European Parliament and of the Council of 23 April 2008 on the European Qualifications Framework for lifelong learning and the establishment of the European Qualifications Framework for lifelong learning. EUR-Lex. https://eur-lex.europa.eu/legal-content/HU/TXT/?qid=1688977065668&uri=CELEX%3A32017H0615%2801%29 (Accessed 17 October 2023).

European Commission, Joint Research Centre, Vuorikari, R., Kluzer, S., Punie, Y., DigComp 2.2, The Digital Competence framework for citizens – With new examples of knowledge, skills and attitudes, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2760/115376 (accessed 12.10.2023).

6.2 Annex 1. Definitions of European Qualification Framework

Available in all European languages: 2017/C 189/15, 2017.6.15

(e) 'learning outcomes' means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;

(f) 'knowledge' means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual;

(g) 'skills' means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);

(h) 'responsibility and autonomy' means the ability of the learner to apply knowledge and skills autonomously and with responsibility;

(i) 'competence' means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

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6.3 Annex 2 EQF levels

	Knowledge	Skills	Responsibility and autonomy	
	In the context of the EQF, knowledge is described as theoretical and/or factual.	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).	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 1
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 solve routine problems using simple rules and tools.	Work or study under supervision with some autonomy.	Level 2
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 3
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 4
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 5
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 6
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 7
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.	Level 8

6.4 Annex 3 DigComp 2.2

Digital Competence Framework

Developing digital skills is a key learning objective for 21st century education. DigComp 2.2 is a tool for a standardised description of digital skills published in 2022, the latest version of the reference framework published by the European Commission's Joint Research Centre[1] in 2013, with many examples for the benefit of curriculum developers.

Preparing citizens to use digital tools confidently, knowledgably, and appropriately is a core task of education. The development of digital skills in learning objectives should be included in all qualifications, curricula, and lesson plans, regardless of the field, level and form of training.

DigComp 2.2 breaks down the learning outcomes into **5** domains, and into additional themes within each domain.

Information and data management

- 1.1. Browsing and searching for data, information, and digital content
- 1.2 Evaluation of data, information, and digital content
- 1.3 Management of data, information, and digital content

Communication and cooperation

- 2.1. Interaction supported by digital technology.
- 2.2. Sharing using digital technologies
- 2.3. Exercising citizenship through digital technologies
- 2.4. Collaboration using digital technologies

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- 2.5. Net label
- 2.6. Digital identity management

Creating digital content

- 3.1. Digital content development
- 3.2. Integration and transformation of digital content
- 33. Copyright and terms of use
- 3.4. Programming

Security

- 4.1. Protection of equipment
- 4.2. Protection of personal data and privacy
- 4.3 Protecting health and well-being
- 4.4. Protecting the environment

Problem solving

- 5.1. Solving technical problems
- 5.2. Identifying needs and technological responses
- 5.3 Creative use of digital technology
- 5.4. Identifying digital competence gaps

It describes the skills that can be acquired at the four levels of proficiency within the topic:

- basic level,
- intermediate level,
- advanced level,
- master level,

.. and distinguishes two further levels within each level. The classification levels are called *dimensions* in the document.

As you progress through the levels, each skill has several task descriptions, for example:

***Area (dimension 1)**:*

1. Information and data management

***Topic (dimension 2)*:**

1.1. Browsing and searching for data, information, and digital content

Skill level (dimension 3) further broken down into two levels:

1. *At a basic level, with help I* can
    1. recognise my own information needs
    2. find data, information and content easily in a digital environment,
2. *At a basic level, independently* and with appropriate guidance where necessary, I can
    1. recognise my own information needs
    2. find data, information and content easily in a digital environment,

Description by knowledge, skills and attitudes (dimension 4)

Knowledge

1. You know that your search results may include online content that is not open access
2. is either free and you have to pay a fee to access it or register for a service.
3. It is aware that users often pay for online content that is available to them free of charge through advertising or by selling their data.
4. ...
5. ...

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Skill

1. You can choose the search engine that is most likely to meet your search needs, as different search engines may give different results even for the same search.
6. Know how to improve your search results by using the search engine's advanced features (e.g.: exact phrase, language, region, last updated date).
7. Know which keywords and phrases to use to get the best search results while communicating with a virtual interlocutor or assistant (e.g. Siri, Alexa, Cortana, Google Assistant), recognising that the query must be clear and unambiguous to enable the system to provide the necessary answer (MI)
8. ...
9. ...
10. ...

Attitude

11. You can choose the search engine that is most likely to meet your search needs, as different search engines may give different results even for the same search.
12. Know how to improve your search results by using the search engine's advanced features (e.g.: exact phrase, language, region, last update date).
13. Know which keywords and phrases to use to get the best search results while communicating with a virtual interlocutor or assistant (e.g. Siri, Alexa, Cortana, Google Assistant), recognising that the query must be clear and unambiguous to enable the system to provide the necessary answer (MI)
14. ...

Use cases (dimension 5)

For those listed in dimension 4, we get case studies for job search and learning at this level:
Employment: job search process
With the help of an employment adviser

- I can use this list to identify job portals that can help you find a job.
- I can also find, access and navigate these job portals in my smartphone's app store

STUDY: group work with classmates
With the help of my teacher

- From the list in my digital textbook, I can identify websites, blogs, digital databases and search for literature on the subject of the report.
- I can identify specific literature topics on websites, blogs and digital databases and navigate between them.

The DigComp 2.2 framework is quite complex at first glance, but it is not intended to be a reading book, but rather a handbook to be used for curriculum development, planning lessons and projects, and to draw ideas from the examples to describe learning outcomes and objectives related to digital skills development.

[1] Joint Research Centre https://joint-research-centre.ec.europa.eu/index_en

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