

Didactic and methodological notes for:

Main modules "Planning, commissioning and operation of a solar thermal system"

Goal of the module
<p>Objective of the entire learning unit:</p> <p>In this learning module, the installation and commissioning of a solar thermal system is planned for the energy-efficient heat supply of a new residential building, and common and exemplary error patterns of solar thermal systems are worked out. In the main module, the structure and function of the overall system and the most important components are worked out. In sub-module 1, the work steps for electrical commissioning and in sub-module 2 possible operating faults are dealt with.</p> <p>Introduction scenario of the main module</p> <p>You have been commissioned to ensure the hot water supply of a residential building in a remote location with a solar thermal system. A plant mechanic and an electrician are sent to the project site for the installation.</p> <p>A photovoltaic system has already been installed on the building, providing a reliable power supply. Drinking water is drawn from a domestic well that is fed with spring water.</p> <p>Their task is to plan the installation of the solar thermal system and to commission the system after installation.</p> <p>Target groups EQF level 3-4:</p> <p>Students</p> <ul style="list-style-type: none"> - plant mechanic / plumber - electrician

Competence profile related to the VQTS-Matrix			
Competence areas	Competence development steps	Level	Interdisciplinary / cross-disciplinary competences
Assembly, disassembly and disposal of building systems and their components	<ul style="list-style-type: none"> ✓ He/she can assemble and disassemble components of building systems according to existing assembly and installation plans and in compliance with 	EQF 3-4	<ul style="list-style-type: none"> ✓ The student knows the most important elements (mechanical and electrical) of a solar thermal system and their function. ✓ The students understand the technical symbols shown in a hydraulic diagram.

	applicable standards, regulations, and laws.		<ul style="list-style-type: none"> ✓ The students are able to understand the different cables and their function. ✓ Students are able to analyse construction plans.
Communication across trades, also in foreign languages	<ul style="list-style-type: none"> ✓ He/she can understand basic technical terms of his/her own and other professions. ✓ He/she can hold discussions with superiors and employees of his/her own and other trades as well as with customers in an appropriate manner and present and explain facts. ✓ He/she can read product data sheets and follow assembly and operating instructions for his/her own and other trades. 	EQF 3-4	<ul style="list-style-type: none"> ✓ Students understand the interface between their work and the work of other areas. ✓ The students know which components are to be wired. ✓ The students can give self-confident feedback.

Competence profile related to the matrix for sustainable thinking and acting	
Competence area	Competence development steps
Interdisciplinary collaboration: working efficiently in multidisciplinary teams, collaborating with experts from different fields to achieve common goals in terms of sustainability and environmental improvement.	He/she co-operates with others on basic tasks and understands the importance of working together to achieve sustainable goals.

Country	Where can the module be implemented in your national curriculum?
Germany	Vocational training for learning field 9 (installation of drinking water heating systems)
Finland	A unit based on local competences. The training provider defines the requirements for vocational competence and the assessment of competence in a similar way to the vocational units.
Spain	Heat-generating systems, installation and maintenance of solar energy systems.

In which way does the module enrich the content of one profession with qualification requirements from previously unrelated areas
<ul style="list-style-type: none"> ✓ Learners learn how to use the correct symbols for the technical communication of technical systems from the perspective of another trade. ✓ Electricians gain more expertise in solar thermal systems. ✓ Installers gain more expertise about the electrical requirements of the solar thermal system and the necessary cabling. ✓ Students understand the needs of other trades in relation to solar thermal systems. ✓ The trainees communicate effectively with trainees from other professions.

Training plan Main module			
Title of the lessons / individual	Competences	Duration / volume in training hours	Comments
Introduction and introduction to the learning situation		90 mins	Agreement on the scope and quality of the product to be created.
Information Phase	<ul style="list-style-type: none"> ✓ They know the most important elements (mechanical and electrical) of a solar thermal system and their function. ✓ The students understand the symbols shown on a construction plan. Pupils are able to understand the different cables and their function. ✓ The students understand the interface between their work and the work of the other subject areas. ✓ The students know which components are electrically connected. 		The students look through the information material and use it to familiarize themselves with the most important components and functions of the solar thermal system.
Product creation	<ul style="list-style-type: none"> ✓ Pupils will be able to diagram a solar thermal system using the correct symbols for both trades 	60 mins	
Presentation and evaluation of the products	<ul style="list-style-type: none"> ✓ The students present their products to other students from other trades, taking into account their own and new knowledge from the previous teaching phases. 	90 mins	<p>Half of the groups switch to another team to present their products to each other.</p> <p>The learners give themselves criteria-based</p>

	✓ The students can evaluate the product quality of the other groups based on criteria and make constructive suggestions for improvement.		feedback on the quality of the functional diagram they have created.
Reflection / Evaluation	✓ The students can evaluate their own learning progress and formulate questions on this basis to close the last gaps in their knowledge.	120 mins	✓ The students reflect on the product creation phase in guided student-teacher discussions. ✓ The students use their newly acquired knowledge to create a functional description.

Description of the tasks for competence assessment

- Evaluation of the functional diagrams as part of the group work
- Evaluation of the functional descriptions of the solar thermal system of the individual work