

IMPROVING THE PROFESSIONAL SKILLS IN GREEN CONSTRUCTIONS THROUGH ONLINE TRAINING

Erasmus+ Strategic Partnership KA2

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DEVELOPMENT OF THE MODULES

04 - Final Report



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1. INTRODUCTION

1.1. AIM OF THE INTELLECTUAL OUTCOME

There are three interactive e-Learning training modules and glossary in the area of green construction.

Three of our partners have necessary experience and capacity from lecturers in developing accrediting such Modules, Educational content analysis and discussion, Development of test for evaluating and analysing the competencies of trainees.

1.2. THE WORKING PROCESS AND TECHNOLOGIES

At this stage, the content of e-learning is actually being produced. Content can vary greatly depending on the resources available.

In our project, eLearning consists of materials of various types with interactivity and using multimedia (e.g. audio or video files) as well as assignments and tests.

Developing interactive content consists of three basic steps:

- Content development: writing or gathering all the necessary knowledge and information;
- Storyboard development: integrating instructional methods (all the pedagogical elements needed to support the learning process) and media elements. This is done by developing the storyboard, a document that describes all the components of the final interactive products, including images, text, interactions, assessment tests; and
- Courseware development: developing media and interactive components, producing the course in Moodle Web Platform and integrating the content elements into a learning platform that learners can access.

At this stage the course is delivered to the partners. The course material is installed on a server and is available for analysis. The discussions, led by the module developers, clarify the management and functional capabilities that are important for the students' activities.

Technologies for the production and provision of e-learning are needed. Various tools can be used to create e-Learning content, depending on which file formats are used and the nature of the desired end product. Microsoft PowerPoint or even Word can be sufficient to create simple learning resources such as a presentation or a lesson. However, more sophisticated tools are required if you want to create interactive content. Curriculum tools are special-purpose tools that create interactive e-learning content. They add text, graphics and other media, but also provide a framework for organizing pages and lessons for reliable navigation. While most of these tools are standalone packages that include evaluation and testing capabilities, some integrate these features from other programs. To create multimedia components, authoring tools need assistive software (such as Adobe Photoshop for raster, Adobe Illustrator for vectors, and Adobe Flash for animations) and other video and audio creation and compression tools. The Learning Platform (in our case the MOODLE platform)



is a set of interactive online services that provide learners with access to information, tools and resources to support education and management. The MODODLE platform provides access and services to a broad consumer base via the Internet.

The MOODLE platform is commonly referred to as a Learning Management System (LMS) or Learning Content Management System (LCMS), terms that are often used interchangeably. The most important platform features used by us (developers) of green building modules include:

- Content management: creation, storage, access to resources;
- Mapping and curriculum planning: lesson planning, personalized study paths, assessment;
- Learner engagement and management: information for learners, tracking progress; and
- Tools and services: forums, messaging system, blogs, group discussions

2. E-MODULES

GREEN CONSTRUCTION

"Ensuring the sustainable development of humanity is the most important problem faced by the world community." This statement was made in 1987 by the UN General Assembly. Since then, it has not lost its significance. The concept of sustainable development has been actively discussed by world leaders today. Climate change and its impact are becoming increasingly important and attracting attention worldwide. Thus, climate change and sustainability issues are becoming a priority for governments, stakeholders, construction industry leaders and companies. The impact of sustainable construction has environmental, social, economic and other aspects. The consumption of a lot of energy in modern construction of buildings and their maintenance has negative consequences, which calls for the buildings' refurbishment and renovation. Ecological aspects also include excessive water consumption, environmental pollution (noise, vibrations, fumes, etc.) as well as disturbance to biodiversity. Social aspects concern the creation of a more comfortable environment for the building's inhabitants. Sustainable construction does not tolerate the waste of materials, energy and raw materials (such as water and air, for example), encourages the use of recyclable products, and draws attention to the technological solutions that ensure the proper exploitation of a building and the comfort of the residents. Reducing the impact of buildings on the environment throughout their life cycle, but also optimizing their economic value, quality and efficiency - this is the main goal of sustainable construction. It sets out best practices in the design, implementation, maintenance and reconstruction of buildings. Sustainable construction is not only wishful thinking, but a trend driven by a number of factors, such as increasing resource prices, climate change, and last but not least, the concern about nature.



2.1. MATERIALS FOR GREEN CONSTRUCTION

Aim of the module:

The aim of the module "Materials" is for the trainees to become acquainted with the green / sustainable / construction - with its principles and peculiarities. To give knowledge about natural building materials and their characteristics, their designation and use in "green building". At the end of this module, learners must gain competencies for:

- Understanding green building and natural building materials;
- Understanding the history of construction techniques - prehistory, antiquity and medieval techniques, industrial and post-industrial period;
- Understanding the tree as a natural building material;
- Getting to know the stone as a building material;
- Understanding clay and straw as a natural building material;
- Understanding the use of secondary, waste and recycled materials;
- Understanding the use of natural materials of plant and animal origin in green building construction;
- Understanding the use of paints and varnishes for insulation.

Knowledges about:

1. The essence of sustainable construction;
2. Principles of sustainable construction;
3. The structure of sustainable construction;
4. Characteristics of green buildings;
5. Characteristics of sustainable / green / material;
6. Guidelines and barriers to sustainable construction;
7. The history of construction techniques - prehistory, antiquity and medieval techniques, industrial and post-industrial period;
8. The main advantages and disadvantages of wood, stone, clay, straw and other natural materials as a building material;
9. Application of natural materials in green building.

Content of Module

TOPIC 1: MATERIALS

Purpose:

1. Understanding green building and natural building materials.



2. Understanding the history of construction techniques - prehistory, antiquity and medieval techniques, industrial and post-industrial period

Knowledge and skills:

- The essence of sustainable construction;
- Principles of sustainable construction;
- The structure of sustainable construction;
- Characteristics of green buildings;
- Characteristics of sustainable / green / material;
- Guidelines and barriers to sustainable construction;
- The history of construction techniques - prehistory, antiquity and medieval techniques, industrial and post-industrial period.



Estimated Time	90 min.
No. of Page	16
No of question	10
No. of Figure	12
No. of Videos	7



TOPIC 2: WOOD

Purpose: Understanding the tree as a natural building material

Knowledge and skills:

- The main advantages and disadvantages of timber as a building material;
- Physical, mechanical and chemical properties of wood;
- Application of wood as a building material;
- Application of different tree species in construction.



Estimated Time	90 min.
No. of Page	14
No of question	11
No. of Figure	15
No. of Videos	16

TOPIC 3: STONE

Purpose: Getting to know the stone as a building material

Knowledge and skills:

- The main advantages and disadvantages of the stone as a building material;
- Physical, mechanical and chemical properties of granite, marble, gneiss, limestone, shale, nephrite and tuft;
- Application of granite, marble, gneiss, limestone, shale, nephrite and tuft as building material.





Estimated Time	90 min.
No. of Page	13
No of question	11
No. of Figure	19
No. of Videos	10

TOPIC 4: CLAY

Purpose: Understanding clay and straw as a natural building material

Knowledge and skills:

- The types of clay used in construction;
- The properties of clay;
- Clay construction techniques;
- Types of straw bales;
- Techniques for building with straw bales;
- The properties of sand and its application in construction.





Estimated Time	90 min.
No. of Page	12
No of question	11
No. of Figure	12
No. of Videos	19

TOPIC 5: SECONDARY MATERIALS

Purpose:

- Understanding the use of secondary, waste and recycled materials;
- Understanding the use of natural materials of plant and animal origin in green building construction.
- Understand the use of insulation materials for exterior walls

Knowledge and skills:

- The use of waste products;
- Laying heat insulation with recycled materials;
- The use of natural materials of plant origin in green construction;
- The use of natural materials of animal origin in green construction.
- The use of linen for thermal insulation
- Laying heat insulation with hemp;
- Applying sheep wool for heat insulation;
- The installation of a foam glass for thermal insulation;
- Laying of reed panels for thermal insulation;
- The use of insulation materials for external walls.



Estimated Time	90 min.
No. of Page	15
No of question	11
No. of Figure	5
No. of Videos	18

There are many opportunities for reusing waste products as secondary raw materials

PRIMARY MATERIALS	SECONDARY MATERIALS
Embankment sand	<ul style="list-style-type: none"> - Sifted sand - Processed sand - Powdered ash from spent fuel - Slag from waste incinerators - Phosphorus sand slag
Concrete and Masonry sand	<ul style="list-style-type: none"> - Sifted sand - Processed sand
Sand for Limestone-Sand Bricks	<ul style="list-style-type: none"> - Sifted sand
Rubble	<ul style="list-style-type: none"> - Crushed concrete (grain) - Crushed masonry mortar, mixed grains - Artificial inert material - Slag from waste incinerators - Phosphorus sand slag
Crushed stone/gravel	<ul style="list-style-type: none"> - Crushed concrete (grain) - Crushed masonry mortar (grains) - Mixed grains - Phosphorus sand slag
Limestone or marl	<ul style="list-style-type: none"> - Powdered ash fuel - Light ash from waste incinerators

Potential replacement of primary with secondary materials



TOPIC 6: INSULATION PAINTS & VARNISHES – PROPERTIES & CHARACTERISTICS

Purpose: Understanding the use of paints and varnishes for insulation

Knowledge and skills:

- The use of paints and varnishes for insulation;
- Choice of paint and varnish for insulation;
- Peculiarities of façade painting.

Estimated Time	90 min.
No. of Page	12
No of question	10
No. of Figure	5
No. of Videos	8

2.2. ENERGY EFFICIENCY AND GREEN TECHNOLOGY

Aim of Module:

It focuses on improving energy efficiency and improving the comfort of living in buildings. Energy-efficient renovation of buildings is the great potential for energy savings and the "key to achieving climate goals". This includes the application of thermal insulation measures for the building envelope as well as the use of efficient heating through renewable energy technologies. Module 2 covers the types of building envelope refurbishment systems applied depending on the construction and purpose of the buildings and their construction with materials with minimal harmful footprint on the basis of ecological construction. Energy-renovated buildings, or the so-called Green Buildings, also include low-energy appliances and renewable energy technologies such as solar panels, biomass, and geothermal sources. This module will provide:-

- Awareness of the potential of the construction sector in combating climate change and presenting measures in the construction sector contributing to energy efficiency
- Improvement of the professional competences of construction workers in their practical work on energy renovation of buildings



Knowledge about:

- Acquisition of professional skills in the process of environmental energy renovation of buildings
- Skills for correct selection of the stages of work in energy renovation of buildings.
- Introduction of the types of facades of thermal insulation applied to different types of facades of buildings for ventilated facades, for an external wall with a cavity.
- Introduction of the method of facade thermal insulation of historic buildings.
- Acquiring knowledge about the stages of selection and application of the External Thermal Insulation Combined System (ETICS) as a thermal insulation system.
- Skills for selection of environmentally friendly insulation materials depending on the building structure and the applied method of thermal insulation.
- Structure and application of the thermal imaging camera to detect defects in construction.
- Introduction to the use of renewable energy sources to reduce energy consumption during the operation of buildings such as solar thermal, photovoltaic and / or biogenic fuels.

Content of Module**TOPIC 1: ENERGY RENOVATION****Aim of Module:**

- Improving, Understanding and Engaging in joint efforts to protect the climate by improving the energy efficiency of buildings.
- The importance of energy renovation and the use of green insulation materials to reduce harmful greenhouse gases and build a comfortable and healthier living environment.

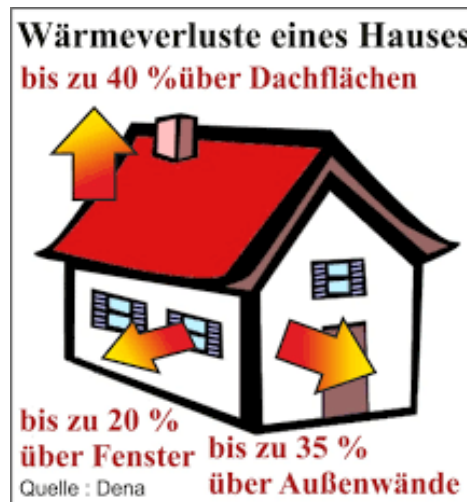
Knowledge about:

- Understanding the potential of the construction sector in dealing with climate change
- Getting acquainted with the measures in the construction sector contributing to the efficient use of energy
- Respecting the requirements for reducing the risk of fire during renovation of buildings
- Expanding knowledge to solve and eliminate moisture problems when renovating buildings

Skills:

- Acquiring professional skills in the energy renovation process of buildings
- Skills for selection of insulating materials depending on the building structure and the height of the building
- Skills for correct selection of the stages in energy renovation of buildings.





Estimated Time	435 min.
No. of Page	13
No of question	9
No. of Figure	7
No. of Videos	1

TOPIC 2: THERMAL INSULATION FOR BUILDINGS

Purpose:

To help improve the professional competencies of construction workers in their practical thermal insulation work.

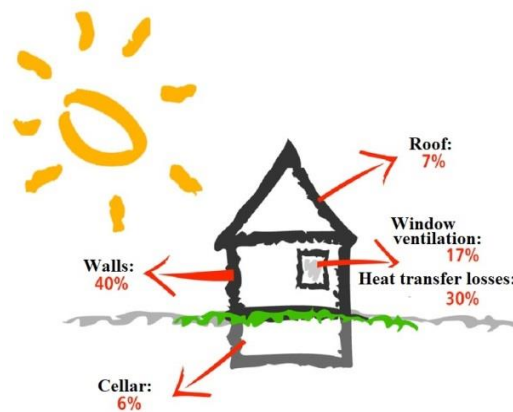
Knowledge:

- Understanding the purpose of thermal insulation to reduce the energy costs of buildings;
- Understanding the role of thermal insulation in relation to climate change;
- Acquiring knowledge about the application of ecological insulating materials.

Skills:

- Knowledge related to the basic requirements applied to thermo-insulation
- Skills for selection of environmental thermal insulation materials





Estimated Time	135 min
No. of Pages	14
No of question	8
No. of Figure	9
No. of Videos	-

TOPIC 3: EXTERNAL THERMAL INSULATION

Purpose:

- Increasing the educational level and the competitiveness of the construction workers in the field of the external thermal insulation composite system (ETICS).
- Familiarization with the façade thermal insulation as a means of reducing the energy consumption of the buildings, as well as with the technology of the external thermal insulation composite system (ETICS)

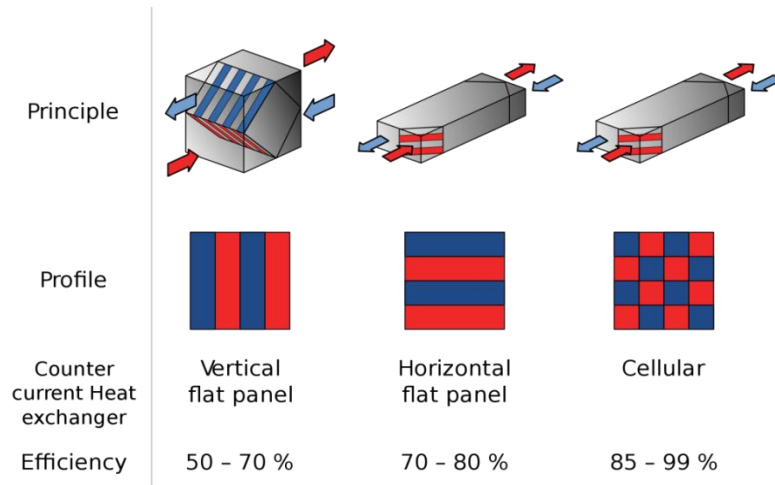
Knowledge:

- Acquiring knowledge about the application of ETICS as a thermal insulation system
- Introduction to ETICS elements and requirements
- Knowledge of used insulation materials, including green insulating materials in the ETICS
- Understanding the ETICS installation stages



Skills:

- Performing the preparatory work required to install the ETICS
- Acquiring skills regarding the participation in the installation of the individual components of the ETICS
- Skills to evaluate the advantages and disadvantages of the ETICS



Estimated Time	105 min.
No. of Page	8
No of question	6
No. of Figure	3
No. of Videos	-

TOPIC 4: CURTAIN WALLS WITH INSULATION

Purpose:

- Introduction to thermal insulation of ventilated facades - what is the thermal insulation of the ventilated facades and when it is done.
- Presentation of structural elements and the used insulation and materials for the exterior lining as well as the advantages of the ventilated facade.

Knowledge:

- Understanding the method of thermal insulation on the ventilated facades;



- Selection of insulating materials, including appropriate ecological insulation materials;
- Knowledge of the advantages of heat insulated ventilated facades.

Skills:

- Ability to apply heat insulation to ventilated facades;
- Skills to assess the advantages of heat insulation on ventilated facades.



Estimated Time	120 min.
No. of Page	11
No of question	7
No. of Figure	5
No. of Videos	-

TOPIC 5: CORE INSULATION OF THE FACADE

Purpose:

With the given subject the trainees reach a new aspect of the façade thermo-insulation applied to buildings whose outer walls are with two shells.

Knowledge:

- Adding new knowledge to the methods used for thermal insulation of cavity walls
- Acquiring knowledge about insulating materials used for thermal insulation of cavity walls
- Understanding the advantages and disadvantages of the method of isolating cavity walls

Skills:

- Trainees should be able to apply insulation materials in accordance with the requirements specified in the Insulation Material Specification;



- Develop skills to perform specific cavity wall insulation operations.



Estimated Time	90 min.
No. of Page	8
No of question	11
No. of Figure	5
No. of Videos	1

TOPIC 6: INSULATING CLINKER – INSULATE AND CLINK IN ONE

Purpose:

Through the given subject, the trainee acquires competence in the application of insulating clinker for façade thermal insulation.

Knowledge:

- Acquiring knowledge about clinker production steps;
- Adding new knowledge about the properties and application of the clinker;
- Understanding the advantages and disadvantages of the façade thermal insulation method using an insulating clinker.

Skills:

- The trainee is able to apply the acquired knowledge when performing isolation with clinker;
- The trainee applies the insulation material according to the requirements specified in the specification for the insulation material;
- The trainee develops skills for performing specific operations for the installation of façade insulation with an insulating clinker;
- The trainee understands its own role in installing isolation clinker and be aware of the need to upgrade their qualification.





Estimated Time	45 min.
No. of Page	5
No of question	5
No. of Figure	3
No. of Videos	-

TOPIC 7: INTERIOR INSULATION OF THE FACADE

Purpose:

Through the given topic the trainee gets to know the internal insulation of the walls of a building for the purpose of insulation of the façade. Insulation on the inside of the wall is mainly applied when renovating old buildings (cultural monuments) in which the façade has to be preserved in its original form. For this reason, the outer insulation of the facade is usually impossible. In these cases, internal insulation is a suitable alternative.

Knowledge:

- Acquiring knowledge of how to prepare the walls for insulation
- Knowledge about the achievement of set insulation parameters
- Understanding the advantages and disadvantages of the internal

Skills:

- The trainee is able to apply the acquired knowledge when performing internal isolation;
- The trainee applies the insulation material according to the requirements specified in the insulation material specification;
- The trainee has the ability to apply the basic methods when installing an internal insulation.





Estimated Time	105 min.
No. of Page	13
No of question	5
No. of Figure	12
No. of Videos	-

TOPIC 8: THERMAL IMAGING CAMERA

Purpose:

Through the given topic, the trainee gets to know the thermal chamber's capabilities to visualize heat insulation problems and building abnormalities as well as to take corrective actions in the insulation shell of the building to reduce the heat loss.

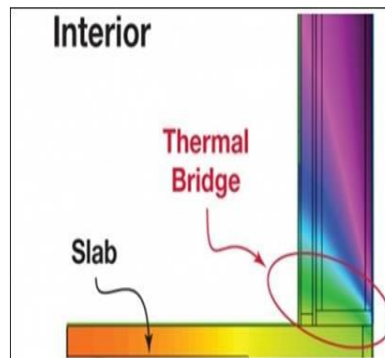
Knowledge:

- Acquiring knowledge of the function of the thermal chamber;
- Skills about gaining a visualized image of heat loss;
- Understanding the similarities and differences of the simple TV camera.

Skills:

- The trainee is able to apply the thermal camera to defect construction problems;

- The trainee can inspect the condition of a building by means of the thermal imaging chamber;
- The trainee gets to know the conditions for conducting thermographic diagnostics.



Estimated Time	105 min.
No. of Page	9
No of question	10
No. of Figure	6
No. of Videos	-

TOPIC 9: RENEWABLE ENERGY & GREEN TECHNOLOGY SOLAR TECHNOLOGY

Purpose:

Through the given topic, the trainee gets acquainted with the advantages of using renewable solar energy for heating and electricity production

Knowledge:

- Acquiring knowledge about the use of solar energy at home;
- Acquiring knowledge about the production of solar electricity;
- Understanding the importance of solar energy in combating global climate change.

Skills:

- The trainee gets to know the basic requirements for the solar collectors;
- The trainee gets to know the types of photovoltaic systems and can justify their choice;
- The trainee acquires skills to point out the advantages and disadvantages of solar sources.





Estimated Time	90 min.
No. of Page	11
No of question	9
No. of Figure	4
No. of Videos	-

TOPIC 10: THE GLOBAL POTENTIAL OF GEOTHERMAL ENERGY

Purpose:

Through the subject, the learner becomes familiar with geothermal energy as a renewable energy source in which heat is produced in the earth.

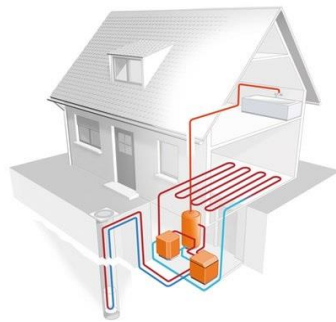
Knowledge:

- Acquiring knowledge about the types of geothermal energy;
- Understanding the types of geothermal energy technologies
- Understanding the importance of solar energy in combating global climate change;
- Getting to know the types of geothermal power plants.

Skills:

- The trainee gets to know basic applications of geothermal energy The trainee gets to know the types of photovoltaic systems and can justify their choice;
- The trainee gets to know the advantages of heat pumps;
- The trainee has the skills to assess the advantages and disadvantages of geothermal energy sources.





Estimated Time	125 min.
No. of Page	9
No of question	6
No. of Figure	7
No. of Videos	2

TOPIC 11: BIOENERGY

Purpose:

Through the given topic, the trainee learns about bioenergy as a renewable energy source

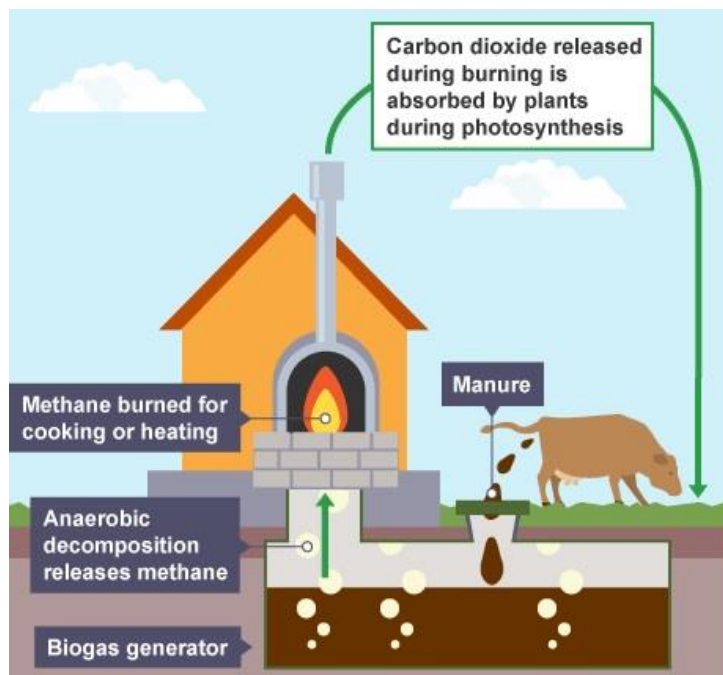
Knowledge:

- Acquiring knowledge about bioenergy;
- Understanding biogas production processes;
- Understanding the types of bioenergy applications.

Skills:

- The trainee gets to know the main uses of bioenergy;
- The trainee has the ability to assess the importance of bioenergy sources in combating climate change.





Estimated Time	135 min.
No. of Page	8
No of question	8
No. of Figure	6
No. of Videos	-

2.3. PASSIVE HOUSE TECHNOLOGY

Aim of the module:

The goal of the module "passive house" is to give learners knowledge building houses with high levels of comfort while simultaneously optimizing primary energy requirements, and energy efficiency in building technologies, also important planning criteria as an optimized building geometry and orientation as well as the selection of constructions for the building envelope with excellent thermal insulation in combination with high-quality windows and ventilation with recuperation. In this module, you will be able to find answers to the following questions and to increase your knowledge and competences in the field of "passive home":



- What is meant by the passive house standard?
- What is meant by "integral planning"?
- How do the plot, its location and the building orientation affect the building energy requirement?
- Which shape is particularly favourable for a passive house?
- Building envelope.
- Window in the passive house - how do I size correctly?
- Summer thermal protection and shading systems.
- What is a thermal bridge?
- How do I plan the "airtight level"?
- Ventilation

Knowledge:-

1. Awareness for principle of the Passive Building concept and study of buildings with nearly zero energy consumption.
2. Familiarize yourself with the pioneers in the construction of passive buildings and current developments in the United States, Canada and Europe.
3. To create energy efficient, environmentally friendly and comfortable residential building that complies with the passive house standards and takes into account the climatic characteristics of the area where the construction will take place.
4. To analyse the solar illumination of the building and to plan the placement of the individual rooms in the "passive buildings" and their location in the plot in which they will be built.
5. To analyse the main factors for achieving the optimal form of a "passive building".
6. Discuss the role of insulation in achieving optimal energy efficiency in the design and construction of "grazing buildings".
7. The role of windows in maintaining the required temperature in the premises of passive buildings is analysed.
8. The role of solar radiation in overheating "passive buildings" in summer is analysed, as well as ways to normalize conditions and create thermal comfort in buildings.
9. The role of thermal bridges in the passive building concept and the possibilities for minimizing them in the construction of buildings are analysed.
10. The role of the ventilation system in the passive building concept and the role of thermal recovery are analysed.

Skills:

The basic skills that students will gain while studying the module are in the field of: THERMAL INSULATION; PASSIVE HOUSE WINDOWS; VENTILATION HEAT RECOVERY; AIRTIGHTNESS OF THE BUILDING; ABSENCE OF THERMAL BRIDGES; ETC.



Content of Module

TOPIC 1: WHAT IS PASSIVE HOUSE?

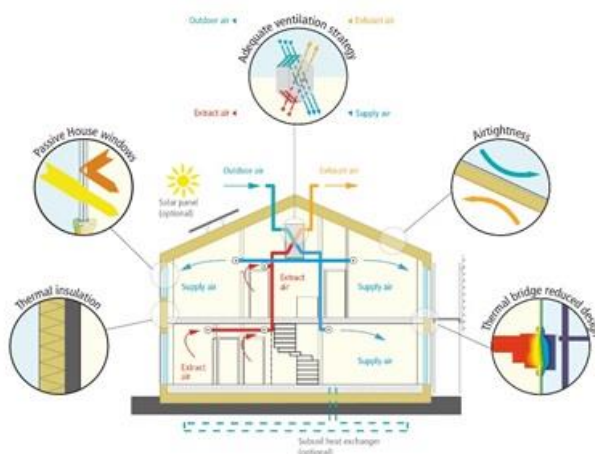
Purpose:

To aware learners with principle of the Passive Building concept and study of buildings with nearly zero energy consumption.

Knowledge and skills:

Study the principles of the Passive Building concept: -

- Optimal level of solar gain;
- Optimum level of thermal insulation;
- Joinery with good thermal insulation properties and high quality glazing;
- Construction without thermal bridges;
- Airtightness; and
- Ventilation with recovery.



Estimated Time	150 min.
No. of Page	10
No of question	12
No. of Figure	7
No. of Videos	1

TOPIC 2: THE HISTORY OF PASSIVE HOUSE

Purpose:

Familiarize yourself with the pioneers in the construction of passive buildings and current developments in the United States, Canada and Europe.

Knowledge and skills:

- Exploring peat houses in Iceland;
- Studying the schooner Fram from the Fritief Nansen expedition;
- Familiarize yourself with the developments of William Sturcliffe of Passive Building concept;
- Familiarize yourself with the transition from Super-Insulation to Passive Building in US and Canada;
- Studying the achievements of the Passive House concept in Germany and Denmark:
- Buildings with almost zero energy consumption;
- Active homes;
- Getting acquainted with the first steps in the construction of passive buildings in Bulgaria.



Estimated Time	210 min.
No. of Page	12
No of question	9
No. of Figure	10
No. of Videos	-



TOPIC 3: WHAT IS MEANT BY “INTEGRATED PLANNING” ?

Purpose:

To create energy efficient, environmentally friendly and comfortable residential building that complies with the passive house standards and takes into account the climatic characteristics of the area where the construction will take place

Knowledge and skills:

Familiarize yourself with the basic requirements of passive house integrated planning:

- Very good exterior insulation throughout the building.
- Optimal dimensions (openings) of the windows from the south, east and west facades in terms of heat protection in summer and solar radiation in winter.
- The north facade should be with small windows with a warm protective coating or no windows.
- Fully airtight interior insulation of the building.
- Take summer heat protection measures, for example: window shading.
- The use of massive building materials is more appropriate in the construction of the building; this is especially true in the summer and at daily high temperature amplitudes (day / night).
- Exterior insulation should not have holes (if possible), i.e. thermal bridges through the exterior insulation of the building should also be avoided.
- The ventilation system must provide high comfort for the residents of the home, supplying fresh air and exhausting the exhaust air while utilizing its heat.



Estimated Time	180 min.
No. of Page	9
No of question	10
No. of Figure	13
No. of Videos	-

TOPIC 4: ORIENTATION, LAYOUT & LOCATION ON THE PASSIVE HOUSE

Purpose:

To analyse the solar illumination of the building and to plan the placement of the individual rooms in the "passive buildings" and their location in the plot in which they will be built.

Knowledge and skills:

- Determine the orientation of the passive building;
- Take into account the heat output from the sun's rays;
- Determine the position of the sun in summer and winter;
- Define the layout of rooms and additional rooms in the building so as to obtain maximum energy efficiency.



Estimated Time	135 min.
No. of Page	11
No of question	10
No. of Figure	10
No. of Videos	-

TOPIC 5: THE PASSIVE HOUSE BUILDING FORM

Purpose:

To analyse the main factors for achieving the optimal form of a "passive building"

Knowledge and skills:

- Achieving optimal area-to-volume ratio (A / V ratio) for a "passive building" by correctly defining or selecting:
 - Construction of the building;
 - Number of floors;
 - Length of the building;
 - Depth of the building;
 - The internal distribution of the premises in the building;
 - The roof of the building.
- Calculation of the A / V ratio of the various simple building forms
- Achieving compactness of the building



Estimated Time	105 min.
No. of Page	7
No of question	10
No. of Figure	13
No. of Videos	-

TOPIC 6: BUILDING ENVELOPE

Purpose:

Discuss the role of insulation in achieving optimal energy efficiency in the design and construction of "green buildings".

Knowledge and skills:

- Selection of external wall insulation
- Choosing interior wall insulation
- Roof insulation
- Foundation insulation
- Choosing windows
- Leak proofing of the building.



Estimated Time	420 min.
No. of Page	11
No of question	10
No. of Figure	23
No. of Videos	1

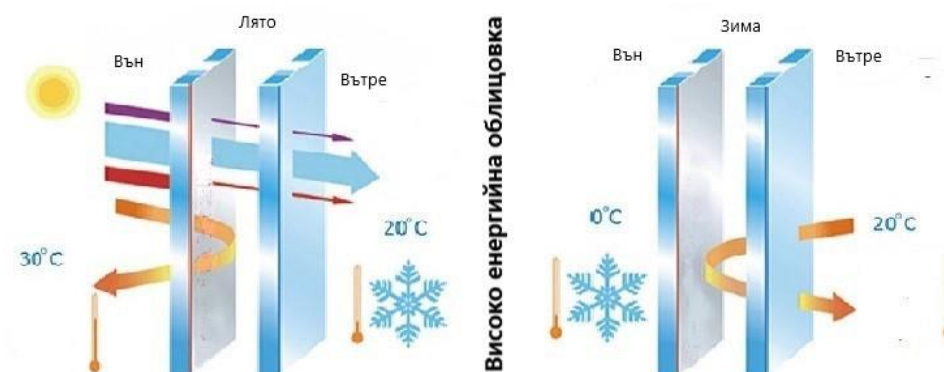
TOPIC 7: PASSIVE HOUSE WINDOWS

Purpose:

The role of windows in maintaining the required temperature in the premises of passive buildings is analysed.

Knowledge and skills:

- Learn which wall the passive house windows should be placed on;
- Learn what the requirements of the windows standard are;
- Choose which thermal insulation is suitable for the windows;
- Understand the correct sequence for installing insulation;
- Analyse the location of windows in the overall concept of "passive building".



Estimated Time	165 min.
No. of Page	9
No of question	10
No. of Figure	20
No. of Videos	-

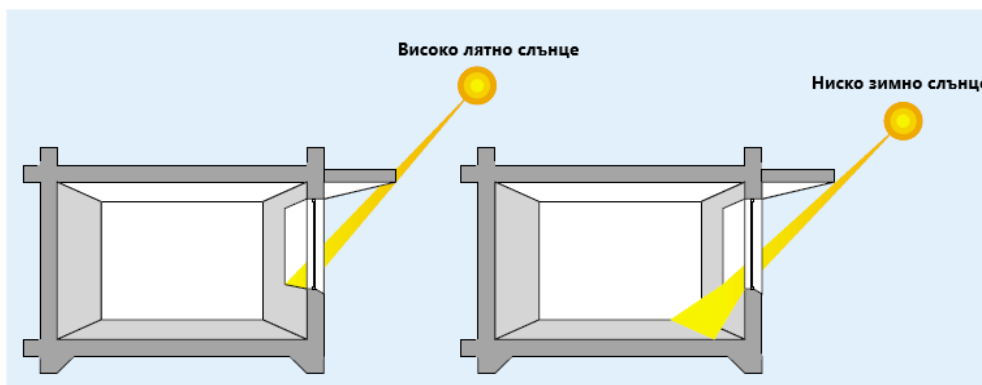
TOPIC 8: SUMMER THERMAL PROTECTION & SHADING SYSTEM

Purpose:

The role of solar radiation in overheating "passive buildings" in summer is analysed, as well as ways to normalize conditions and create thermal comfort in buildings.

Knowledge and skills:

- Calculation of the accumulated heat in buildings;
- Explore ways to protect the building in the summer
- Analyse the role of city isolation;
- Study the different shading systems;
- Gain knowledge of the evaluation of shading systems.



Estimated Time	210 min.
No. of Page	11
No of question	10
No. of Figure	12
No. of Videos	-

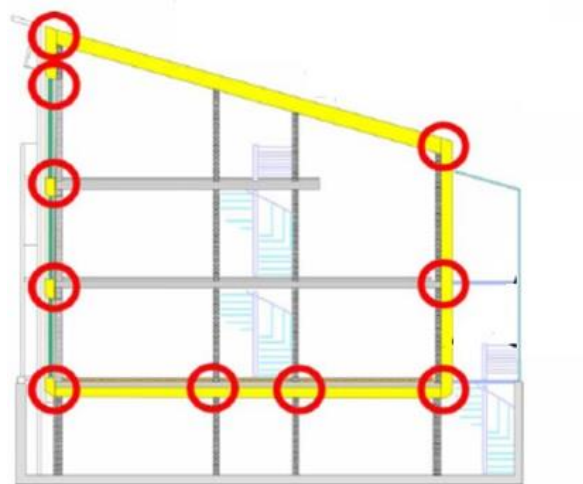
TOPIC 9: THE THERMAL BRIDGE & PASSIVE HOUSE

Purpose:

The role of thermal bridges in the passive building concept and the possibilities for minimizing them in the construction of buildings are analysed.

Knowledge and skills:

- Get acquainted with the nature of thermal bridges;
- Study the classification of the main types of thermal bridges
 - Geometric thermal bridges
 - Building thermal bridges
 - Combined thermal bridges
- Analyse the problem of thermal bridges;
- Start with thermal-physical characteristics of some insulation materials;
- Learn different ways to avoid building bridges.



Estimated Time	150 min.
No. of Page	8
No of question	10
No. of Figure	15
No. of Videos	-

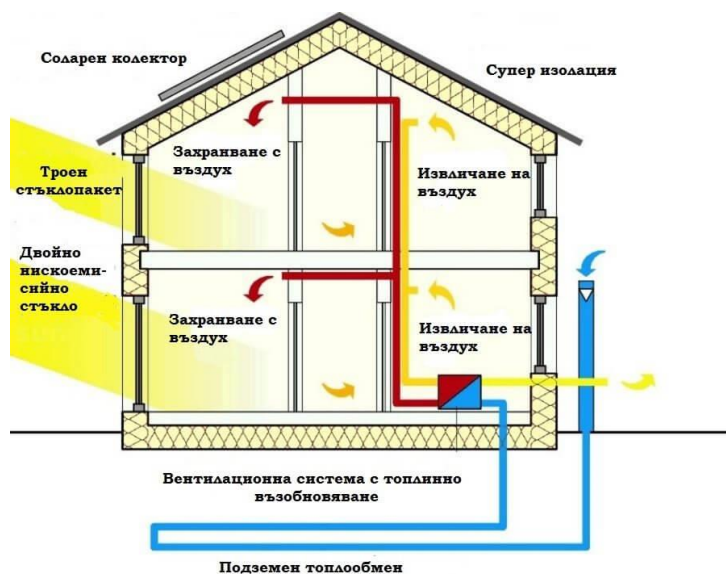
TOPIC 10: VENTILATION WITH HEAT RECOVERY

Purpose:

The role of the ventilation system in the passive building concept and the role of thermal recovery are analysed.

Knowledge and skills:

- Familiarize themselves with the role and importance of the ventilation system in the building;
- Learn how the ventilation system in a 'passive building' should be designed;
- Familiarize themselves with the principle of operation of the ventilation system with heat recovery
- Study the types of heat recovery systems.



Estimated Time	150 min.
No. of Page	8
No of question	10
No. of Figure	9
No. of Videos	1

3. GLOSSARY

STRATEGY FOR CREATING A GLOSSARY

Green construction is a modern area with many new terms and concepts. Sometimes, when one tries to comprehend educational material, educational content by studying the related models in Green Construction, he may have trouble understanding part of the material then he resorts to using the dictionary. This is usually not a language skill issue, but rather one about not knowing the meaning of certain words or phrases specific to the Green construction. Incorrect interpretation may lead to misunderstanding that does not meet trainee's expectations. In order to ensure readers can fully understand a content of the course material, it would be useful to prepare some sort of glossary to collect and define key terms or key phrases in models in the field of green building.

The glossary is created in four languages and is first written in English then in German, Hungarian, Bulgarian and Latvian. The dictionary contains terms from the three green construction modules with about 150 terms.

Experts in a scientific field - as green construction - create new words, new vocabulary of acronyms, names, etc. that we see and use in the educational content that we created. Students studying these fields can consult glossaries of definitions to avoid misunderstandings.

Creating a Glossary in Moodle is a powerful tool for learning and can be very useful for our green construction course.

The Glossary is much more than a normal vocabulary: terms and their definitions can be linked, and site wide glossaries can be used over the whole green construction course so that definitions can always be reached learning each lesson from the different modules.

The great advantage of the glossary is that teachers and trainees are able to develop a shared vocabulary list together. Entries and definitions can be graded and added to the final grade.

A glossary can be an important part of your course. As an expert in your field, you are comfortable using the important terms and concepts in your area of expertise. At its most basic, Moodle's glossary can be used like a regular word list.

During the learning process, the vocabulary created at the beginning can be supplemented and enriched according to the specific needs of the learners. Thus, improving it can become an integral part of the learning process itself. Learning a new subject often begins with acquiring the most important terms and concepts. A glossary is not merely a list of terms with explanations created by a teacher. Entries can also be arranged in categories, have files or keywords added to them, or be automatically interlinked with the corresponding text in the Moodle course pages.

CREATING A GLOSSARY

Adding a glossary

To create a glossary in a course:

1. Click the button Turn editing on to enable course editing mode.
2. In the Add an activity... menu, choose Glossary in the section of the course to which the activity is to be added.
3. The window for adding a new object is opened (see image No. 19). In the Name field, enter a descriptive name for the activity.
4. In the Description field, enter detailed information for the students about this glossary – for what purposes it will be used, who will create entries, what activities the students will have to perform in this glossary.
5. Choose the general settings of the glossary (see the list below).
6. In the Grade section, choose whether to allow entries to be rated. Entries can be allowed to be rated by teachers only or by any user.
7. Specify whether course groups will be used in this activity.
8. Choose whether the resource will be visible to or hidden from the students.
9. Click the button Save and return to course.

The specific settings of a glossary:

Entries shown per page – The number of concepts and definitions shown in a page when the students view the glossary

Glossary Type – Entries from secondary glossaries of the course can be exported to the main glossary. A course may only have one main glossary.

Duplicated entries allowed – If enabled, it will be possible to create multiple definitions for one concept.

Allow comments on entries – If enabled, students and teachers will be able to add comments to entries. The comments will be available by clicking on the link under the definition.



Allow print view – If enabled, students will have a link to print view available, which allows easily printing out the entire glossary. The link appears as a print icon in the upper right corner of the glossary window. Teachers always have the print view available.

Automatically link glossary entries – Moodle can automatically link words used in the course with their definitions in the glossary. Linked words will be visually highlighted.

Approved by default – If students are allowed to add entries to the glossary, it is possible to choose whether new entries are approved automatically and added to the glossary or if teachers have to approve them before they can be seen by other students.

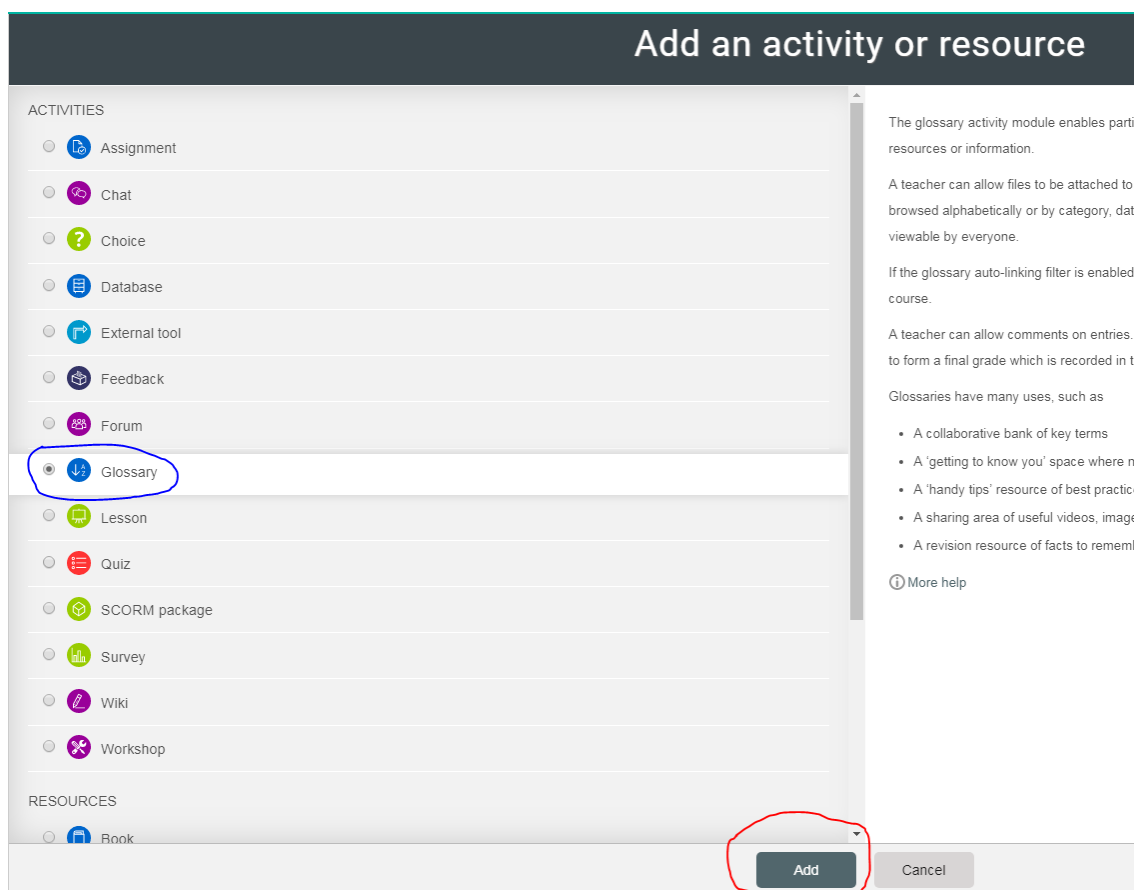
Display format – Sets the format in which the glossary will be displayed.

Show 'Special' link – When users view the glossary, they can choose the first letter of a concept from a list. The link will display the special symbols @, #, \$, and others.

Show alphabet – If enabled, the alphabet is shown, allowing to choose what entries to display.

Show 'ALL' link – If enabled; users will be able to view all entries in one page.

Edit always – If enabled, students are always allowed to edit their entries. If disabled, entries are editable only within 30 minutes after they are added.



Adding a glossary to a course

Adding a new Glossary

Expand all




General



















Name *




















Description

Paragraph **B** *I*

- ☰
- ☷
- ☰

  U ~~S~~ X₂ X²                

Font family Font size                   

Path: p

Display description on course page



Glossary type  Secondary glossary

Entries

Appearance

Grade

Adding a glossary entry:

1. On the main page of the glossary, click the button **Add a new entry** (see image No. 21).
2. In the **Concept** field, enter the word to be defined.
3. In the **Definition** field, enter the definition of the concept.
4. If entry categories have been defined in the **Browse by category** view, they can be added to a concept.
5. In the **Keyword(s)** field, enter keywords or synonyms of the concept. One keyword must be entered in each line, without separating them with commas.
6. Under **Auto-linking**, it is possible to specify whether the entry will be automatically linked with a concept (or keywords) used in the text of the course. It is possible to choose whether the linking will be case-sensitive and match whole words only.
7. Click the button **Save and return to course**.



To add a glossary entry click the "Add a new entry" button in the centre of the screen

Glossary

[Print](#) Search full text

Browse the glossary using this index

Special | [A](#) | [B](#) | [C](#) | [D](#) | [E](#) | [F](#) | [G](#) | [H](#) | [I](#) | [J](#) | [K](#) | [L](#) | [M](#) | [N](#) | [O](#) | [P](#) | [Q](#) | [R](#) | [S](#) | [T](#) | [U](#) | [V](#) | [W](#) | [X](#) | [Y](#) | [Z](#) | **ALL**

▼ General

Concept *

Definition *

Rich text editor toolbar with icons for text formatting (bold, italic, underline, strikethrough, subscript, superscript), lists, links, unlink, insert link, insert image, insert video, insert audio, insert file, insert table, insert table of contents, undo, redo, and other editing functions.

Large empty text area for entering the definition.

Keyword(s) ?

This entry should be automatically linked

If the Glossary auto-linking filter is enabled, and 'This entry should be automatically linked' is set to "yes", the entry will be automatically linked wherever the concept or keyword appear within the same Moodle course.



Using Glossaries

After a glossary has been created, it is recommended to add a few entries, so that the students have an example to follow.

A description of the glossary is displayed at the top of the glossary's main page. Directly below is the search field. If **Search full text** is selected, the entered word will be searched in any position in the text.

Under the search field lays the **Add a new entry** button. After that, it is possible to switch between 4 glossary browsing modes.

Browse by alphabet – entries are browsed by selecting the first letter of the concept.

Browse by category – entries can be grouped and browsed by category.

Browse by date – entries are browsed by their last edited date.

Browse by author – if students are allowed to add entries, this allows to easily see who has added what.

Automatic Linking

Automatic linking of glossary entries works like this: a new entry is created in the glossary, e.g., "Moodle". If this term is entered somewhere in the course text – in a forum, assignment, web or text page, resource description field – it automatically appears as a link. When the link is clicked, a new pop-up window opens, displaying the corresponding entry.

Automatic linking works if:

It is permitted on a system-wide level – determined by the system administrator.

Auto-linking is enabled in the glossary settings – the parameter **automatically link glossary entries**.

Auto-linking is permitted for the particular entry or entry category.

Once you've added an entry to the glossary and enabled auto linking, any instance of a glossary term anywhere in Moodle will have a link to its definition. For example, if you create an entry for the word "Moodle" in the glossary, whenever someone uses the word in a forum, assignment, HTML or text page, or even in a description field, it will be clickable.

Importing and Exporting Glossary Entries

As you build your glossaries, you may want to share them between classes or with other instructors. Fortunately, there's a way to export and import glossary entries without needing to share your entire course structure.

To export glossary entries:

1. Follow the "Export entries" link at the top right of the main glossary page.
2. Click the "Export entries to file" button.



3. Save the automatically generated XML file on your computer.

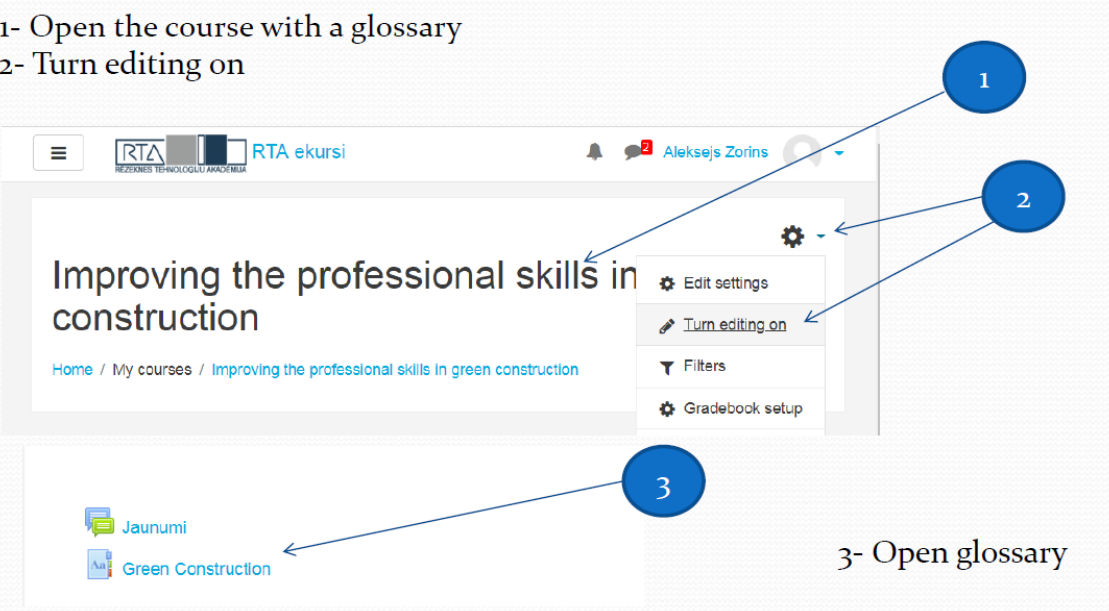
To import glossary entries via an XML file:

1. Follow the “Import entries” link at the top right of the main glossary page.
2. Browse for the exported entries XML file on your computer.
3. Select the destination for the new entries, either the current glossary or a new one.
4. If you want to import category information, click the checkbox.
5. Click the “Save changes” button. You’ll then see a report of the entries and categories added to the glossary. If you enabled duplicate entries when you created the glossary, the import process will add all of the new definitions. Otherwise, it will not allow you to import any duplicate entries.

Exporting glossary in a file – 1*

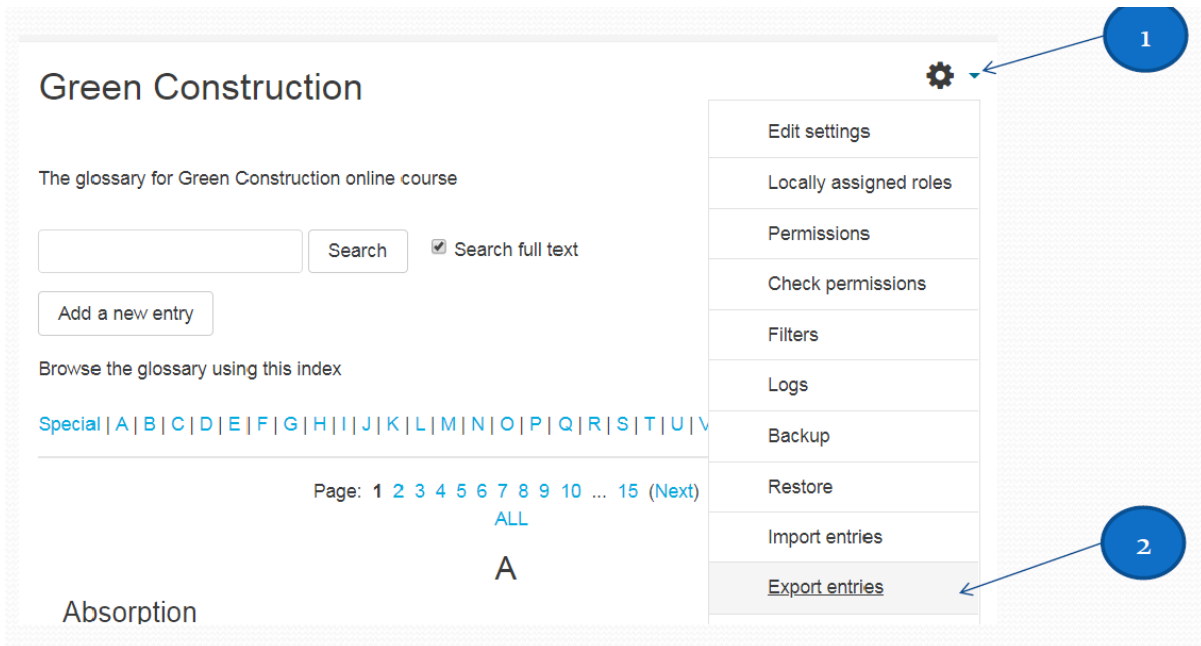
*skip this step if you already have a glossary file available

1- Open the course with a glossary
2- Turn editing on



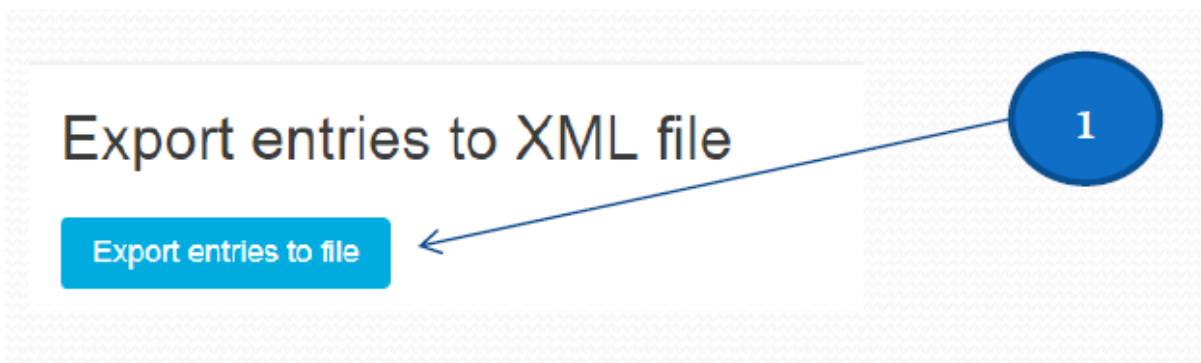
3- Open glossary

Exporting glossary in a file – 2



The screenshot shows the Moodle Glossary interface for the 'Green Construction' course. The page title is 'Green Construction' and the subtitle is 'The glossary for Green Construction online course'. There is a search bar with a 'Search' button and a checked 'Search full text' option. Below the search bar is an 'Add a new entry' button. The page displays a list of entries, with the first entry being 'Absorption'. A settings menu is open on the right side of the page, showing various options: 'Edit settings', 'Locally assigned roles', 'Permissions', 'Check permissions', 'Filters', 'Logs', 'Backup', 'Restore', 'Import entries', and 'Export entries'. A blue circle with the number '1' points to the gear icon that opens the settings menu. Another blue circle with the number '2' points to the 'Export entries' option in the settings menu.

Exporting glossary in a file – 3



The screenshot shows a dialog box titled 'Export entries to XML file'. Inside the dialog box, there is a blue button labeled 'Export entries to file'. A blue circle with the number '1' points to this button.

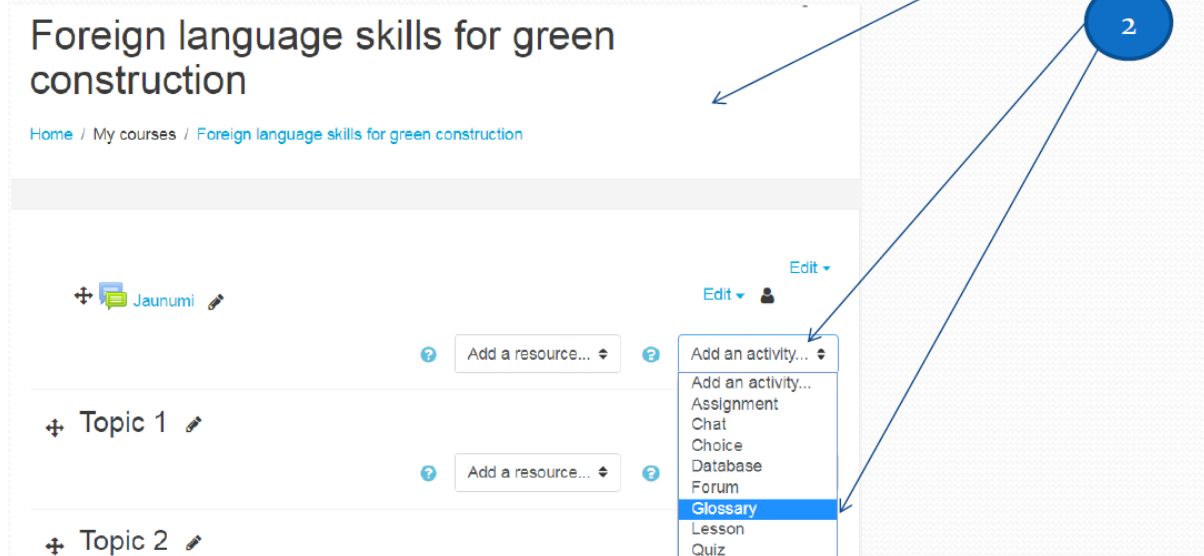
The file will be saved to default Internet browser download folder. You can use this file later to import glossary to another Moodle course.



Importing glossary from file – 1

1- Open the course to import a glossary

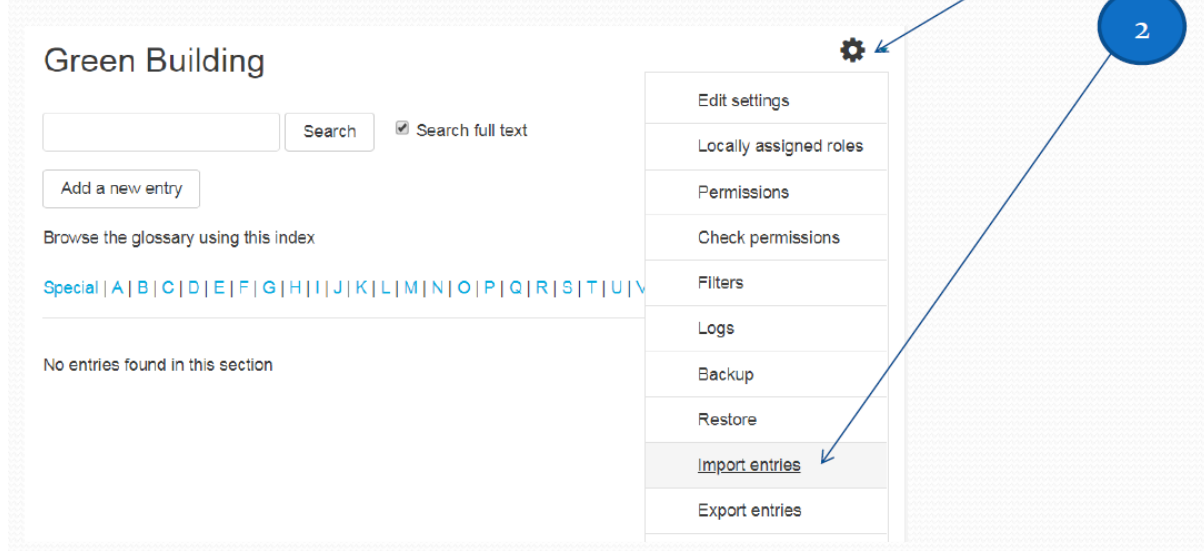
2- Create new glossary



Importing glossary from file – 2

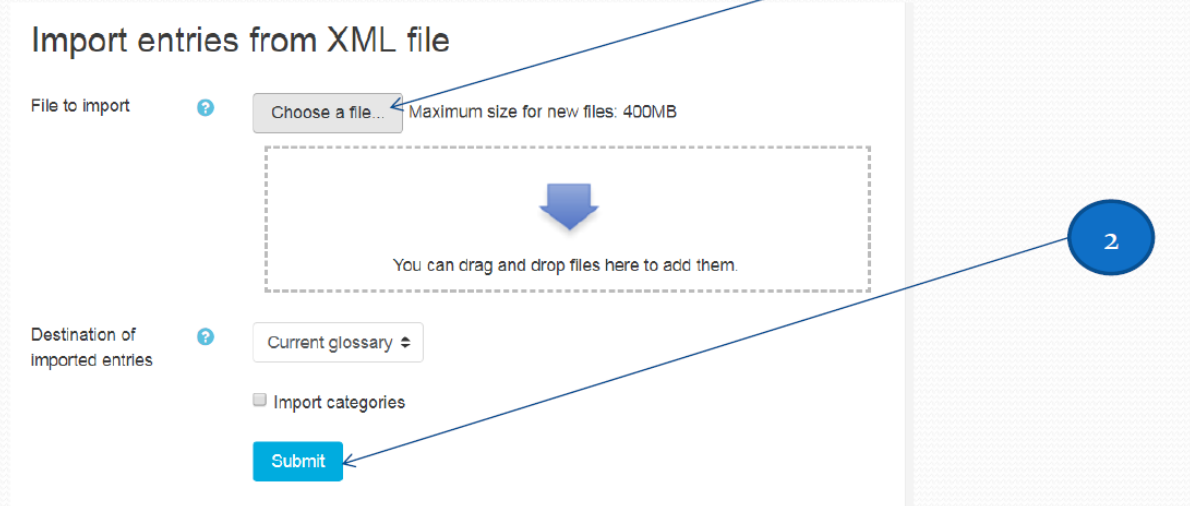
1- Click on the glossary settings

2- Import entries



Importing glossary from file – 3

1- Choose a file from which to import
2- Select Submit



GLOSSARY CAPABILITIES

The glossary module has a number of capabilities available to create roles. With capability overrides, you can enable your students to have a high degree of control over their glossaries.

Glossary capabilities are:

Create new entries

This allows a user to add new entries. If you want a glossary in which only teachers can add entries, you can use a role override to prevent students from adding entries.

Manage entries

A user with this capability can edit and delete other users' entries.

Manage categories

This allows a user to edit and delete glossary categories for organizing the terms.

Create comments

This allows a user to add comments, if commenting is enabled in the glossary. By default, both teachers and students are allowed to add comments. If you want only teachers to be able to add comments, you can use a role override to prevent students from doing so.

Manage comments

This allows a user to edit and delete other users' comments.

Import entries

This allows a user to import glossary entries.

Export entries

This allows a user to export glossary entries.

Approve unapproved entries

If the glossary is set to hide entries until they are approved, a user with this capability can approve new entries. This is a capability to consider giving trusted student moderators.

Rate entries

This allows a user to rate entries, if rating is enabled in the glossary.

View ratings

This allows a user to view all glossary ratings.

Efficient and critical use of dictionaries and glossaries is one of the most important competencies of teachers in green construction.

The glossary module can be used in both in each course and green construction which involves terms acquisition. It is a valuable tool for terms learning and raising teacher's competence level. Glossaries are highly structured texts based on conventions, which is why their compilation requires clear instructions in the form of a compilation guide. On the other hand, Moodle's glossary module is not a full-fledged dictionary writing system or terminology management system, so the structure of glossaries is not too complex. The compilation guide should be concise yet detailed and illustrative. After overcoming the initial barrier and gaining some experience most students find glossary compilation very useful and interesting.

4. CONCLUSIONS

In summary, it can be said that the training modules and glossary developed by the project partners have the following advantages:

- A significant amount of green building training content can be delivered simultaneously to a large number of target group participants.
- The learning is offered in geographically dispersed locations across the EU; Bulgaria, Latvia, Hungary and Germany.
- Despite limited mobility, learners (construction workers); they have access to the learning content; learners have limited daily time to spend on learning.



- The training in our course helps students to develop a homogeneous knowledge of green building.
- From the learners are required to have at least basic computer and internet skills.
- The training aims to build cognitive skills, not psychomotor skills.
- The course addresses long-term, not short-term training needs.
- The course provides an opportunity for learners to learn and evaluate progress at their own pace, thus providing flexibility and motivation.
- The learn content can be reused for different groups of learners in the future.
- Many organizations and institutions are using e-learning because it can be as effective as traditional training at a lower cost.

Developing e-learning is more expensive than preparing classroom materials and training the trainers, especially if multimedia or highly interactive methods are used. However, delivery costs for e-learning (including costs of web servers and technical support) are considerably lower than those for classroom facilities, instructor time, participants' travel and job time lost to attend classroom sessions.

5. PROJECT BASICS

- Acronym: Green construction
- Grant agreement no.: No. 2017-1- LV01-KA202- 035483
- Title: IMPROVING THE PROFESSIONAL SKILLS IN GREEN CONSTRUCTIONS THROUGH ONLINE TRAINING
- Duration: 1 September 2017 – 31 August 2019
- Action type: KA2
- Programme: ERASMUS+
- Participating countries: Latvia, Bulgaria, Germany, Hungary

OBJECTIVES

The project proposal aims through the creation of transnational partnerships to develop training product with innovative multimedia modules to meet the identified needs of the European construction sector of green skills of low-qualified workers and young people who have a choice of profession. The project team will study and analyse the existing trainings in the field of energy-efficient construction in partner countries it takes the identified needs of the European construction sector, into account, and it will develop, test and validate the modules for continuing professional education, in the field of green construction.

COORDINATOR: REZEKNE ACADEMY OF TECHNOLOGIES

Prof. Lybomir Lazov, E-mail: lyubomir.lazov@rta.lv



TARGET GROUPS

- **Primary target group: VET teachers**
- **Secondary target group: VET students**

PARTNERS

- Rezekne Academy of Technologies, Latvia
- Veda Consult, Bulgaria
- Schnellkraft Personalmanagement GmbH, Germany
- European Center for Education, Science and Innovation, Bulgaria
- iTStudy Hungary Számítástechnikai Oktató- és Kutatóközpont Kft., Hungary

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