

Methodology and course content

For ETEROB Project

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1. Methodology

A. Introduction

The blended learning model combining face-to-face traditional and online learning is now the widely preferred model for course design. This section describes chosen method for e-learning module and its advantages and comparing with more traditional method and techniques for design and preparation of e-learning material. In case of blended learning system the selection of technique and methodology is a most important task for preparing online modules that affects face-to-face workshops content to which should be related to. This is also important for making the total costs of the Course significantly lower, acceptable by potential learners.

B. Methodology

Technique selection process was determined by the following important factors:

- Ability to rapid preparation and conversion of learning modules.
- Relatively low pricing level.
- Easy and friendly management processes.
- Flexible and scalable solution that makes design and preparation process relatively shorter.
- Easy to implement in blended learning system.

and business objectives important from enterprises point of view:

- Effective learning delivering outcomes and results to learners as well as business.
- System that can reduce response time and development costs.
- Smart use of rapid tools to innovate.

Critical success factors that should be met for rapid e-learning system:

- All content transfer must happen in stage I, at the beginning.
- Ensure access to all relevant materials at the beginning of the course.
- Define course guideline and workflow upfront and share it with all learners.
- Use simple tool (PowerPoint for example) and user friendly templates.

Asynchronous e-learning model has been chosen because of its advantages especially in case of our blended learning system:

- Cost savings.
- More effective delivery of content.
- Enabling self-paced learning.
- Reduced training time.
- Allows learning 24/7.
- Trains large number of learners in a relatively short time.

Classroom activities for asynchronous learning:

Creating asynchronous activities is one of the most time – consuming of development processes, as such activities require attention to detail and usually a lot of programming. One of the most prevalent of rapid development techniques for asynchronous activities is to repurpose classroom activities that have already been developed for a stand – up class. This is a common practice simply because of the number of trainers who have been trying to repurpose entire classroom programs into asynchronous deliveries. The lack of a facilitator restricts the use of classroom activities significantly. Many classroom activities may be translated well to an asynchronous program and should be chosen well and develop intricately. Group - based activities will not translate well, as there is no group when we introduce learning in a self - instructional mode, but question/answer activities translate very well, as do simulations that are not team based.

Comparing to synchronous e-learning asynchronous one enable us to avoid some important disadvantages of the synchronous e-learning mode, such as:

- Requirement of proper communication software or technology.
- Ineffectiveness due to lack of trained facilitators.
- Special preparation of learners for a synchronous e – learning delivery.
- Lack of effectiveness when content requires face - to - face delivery.
- Not efficient when the class needs to be run many times.
- Lack of eye contact between facilitator and learners.
- Difficulties in obtaining positive reinforcement.

2. Pedagogical and design aspects

Because online courses are still perceived as complementary to traditional lecture-based courses or trainings, the online courses often do not employ pedagogical approaches that fit online learning. In most of the courses and trainings offered by various life-long learning institutions and vocational schools, the use of online components in the teaching processes is relatively limited and often online elements are added to the course after it is already developed and they are not a mandatory part in the leaning processes, but they should be implemented during the design and construction of the course. Despite this, as of today, blended learning model is considered the most effective method for online learning.

Pedagogy in blended learning

Pedagogy can be defined as the art of teaching. It refers to the strategies, methods and styles of instruction. The adoption of technology adds another element in course design to consider. To produce, effective online learning and teaching requires a comprehension of the processes by which students learn and interact with technology. Before new courses are created it is recommended that teachers acquire an understanding of the pedagogy which will underpin their online environment. This section aims to provide the foundation by which teachers can comprehend the strategies for creating successful online courses.

Most good learning experiences usually take place in a special environment. By recreating the sensation of that special event learners can apply the lessons learnt then to different situations. This very much links to the concept of 'flow'. By remembering the sensation of special learning events it may be possible to enhance other learning situations.

Some tips for businesses:

We may see that businesses are facing challenges on an unprecedented scale and the retention of key employees is a major ongoing issue. More and more often employees equally are looking for organizations that value their contribution. One major way of helping all individuals fulfill their potential is to develop a coaching environment. This is very different from the process of 'managing' and could play a major role in the successful implementation of blended learning - a coach guides rather than manages. Managers need to forget about being in control, instead helping their team members to explore by asking open questions and being provocative. Trainers could also perform the role of a coach and may need to recognize that in the future classroom training may become much more focused on the individual, and as a result there may be more small discussion groups or one-to-one coaching than traditional classroom sessions. A major advantage is that if people really begin to adopt coaching behaviors the organization becomes much more of a learning environment and people start to learn from each other.

Course design methodology

The course design process covers the following tasks/procedures to do before the start of development phase. All listed tasks are important for the course quality level perceived both by learners and trainers.

1. Identify the skills and competencies that are needed for professional tasks performance, determine if the learning/training should be more specialized and focused on a particular functions before starting work on the course content.
2. Design a program plan and use methods that best facilitate the needed learning/training, set the program objectives: knowledge and practical skills, select training methods that reflect adult learning principles.
3. Prepare to conduct the training.
4. Set the frames for e-learning modules (program logistics and setting should be optimal for learning).
5. Implement the training. Follow the program plan is necessary. If possible, do not deviate from the planned course schedule, keeping a copy of the program timetable.
6. Measure the effectiveness of teaching/learning process – collect learners opinions about program objectives, content, methods as well as trainers effectiveness using questionnaires given to participants at the end of the course.

For our purpose the following session model has been chosen:

Introduction -> theory – activity – test -> conclusion

The role of the tutor

Supporting blended and online learning involves rethinking the role of the tutor, but it can also open up opportunities to coach and offer support. We can also develop materials, and 'e-tutor' through the virtual classroom. By rethinking some of the knowledge aspects we can make the actual physical training events very special. It is important for tutors to identify where their provision fits within the learning cycle. Their input fits within the overall concept of knowledge transfer that can be enhanced by helping learners learn through their senses. Therefore the more the tutor involves learners in their learning the more effective it will be (in our course this is very important for face-to-face part). A skilful and effective tutor will be closer to the role of the storyteller but however inspiring they are the limit of this presentation should be about 20 minutes.

A tutor designing and orchestrating a perfectly balanced event will need to provide a wide range of learning opportunities. We have to avoid situations where too many learners are being subjected to large classrooms of training content delivery, which only really serves the purpose of recording attendance. The real role of the trainer is to recognize what the learner needs to learn through classroom learning and to identify the value-added benefits. It will be important to look at each area of content and find the most effective way of delivering as well as to look at the overall content and identify whether the needs of people with different learning styles are being met.

Changes in blended course design influenced decisions about face-to-face meetings as much as online components. These changes can be organized around the purpose, number and duration of live meetings in blended courses. Initially, most instructors used the live meetings to cover topics that could not be easily done online and to coordinate upcoming learning activities. The presentations featured the traditional format of lecture/discussion and a PowerPoint. It was common for instructors and learners to arrive at live meetings with the entire course run off. The number of live meetings fluctuated between three and six.

A portion of the live meeting should be devoted to discussing upcoming projects and assignments and focused on learner objectives, and these centered on learning activities that could not be easily done online: role playing in counseling, individualized 'in the moment' reading lessons in literacy, group activities and simulations, requiring immediate feedback and interaction between and among participants. A session might be longer or shorter than the usual three hours, it might involve an individual meeting, small groups of learners.

Pedagogical instructions for tutors/instructors:

- Gaining attention from learners.
- Inform learners about goals and objectives.
- Stimulating learning and recalling of theoretical material needed for starting practical classes.
- Presenting good stimulus and interesting teaching materials.
- Providing learning guidance.

- Eliciting the performance that is especially important for practical classes.
- Giving feedback about performance correctness.
- Assessing the performance and the level of acquired knowledge.
- Enhancing retention and further knowledge transfer in business environment.

Mobile learning

Because mobile technology has been the most rapidly adopted technology in history, the e-learning modules should be accessible via smartphones and tablets alongside laptops or desktop computers. This is important that the workplace is already crowded with such devices and it is possible to provide a personalized experience on a mass medium. Mobile devices enable persistent network connection and therefore servers where the course materials are placed. Mobile learning is “the acquisition or modification of any knowledge or skill through the use of mobile technology anywhere and anytime”. For our purpose iSpring software can be used for making the course content available through mobile devices.

3. Course content

This section includes general description and content for each modules of the Course.

General view

Name of course	European Training Program on Energy Efficient Renovation of Old Buildings
General Aims	To support old or historic buildings refurbishment for better energy performance, support less energy consumption by buildings
Audience	Construction and installation companies (SMEs), local public administration responsible for environmental and energy issues, vocational training institutions, higher education institutions. Managers, engineers and technicians, specialists in renovation/refurbishment technology, architects, SMEs owners, students
Duration (total)	185 hours
Trainer profile	
<i>Degree</i>	Bachelor, engineering or master degree, practitioner/expert
<i>Experience</i>	Knowledge and expertise on buildings refurbishment, renewable energy systems used in buildings, materials science, modern technology for energy efficiency

<i>Experience in training</i>	Two or more years of experience as a trainer/teacher
Exploitation Plan	
Commercialization:	e-Learning platform, website, brochure for direct marketing, email campaign, announcements in printed media
Is there any alliance or external collaboration?	YES
If answer is positive, please indicate it	CISER (Spain), FMS (Italy), Inveni S.A. (Poland), NorthCom s.r.o. (Czech Rep.)
Is there any practice or final project?	Yes
Describe it shortly and indicate its duration	30 hours of practical learning in the form of practical workshops on choosing appropriate materials, refurbishment process design, energy audit planning
Has the course certificate?	Yes
Will it be an official certificate?	Yes
If answer is positive, please indicate it	Certificate issued by partners organization
ECVET points	Yes (assigned to modules (EQF %) and to learning units (number of credits))

Course content including modules and learning units

Name of Module 1	Building refurbishment. An introduction
Name of Unit 1	Fundamentals and market overview
Duration	5 hours
Aims:	To give overall critical look at the energy efficiency in residential buildings
Program	1. Improving the energy efficiency in residential buildings (European perspectives); 2. Weatherization and energy efficiency improvement; 3. Benefits of refurbishment of existing buildings
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Unit 2	Standards for passive buildings. An overview
Duration	5 hours

Aims:	To give basic knowledge on current standards used for energy-efficient buildings
Program	1. LEED Standard; 2. ASHARE Standard; 3. Passive House Certificate
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Unit 3	Conservation of historic buildings. The basics
Duration	10 hours
Aims:	To give basic knowledge on important aspects of conservation of historic buildings and preservation of facades and other historic elements
Program	1. Introduction to architectural conservation; 2. Structural aspects of historic buildings; 3. Upgrading building elements; 4. Energy efficiency and historic buildings; 5. Understanding the building before starting upgrading works
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Module 2	Assessment and evaluation
Name of Unit 1	Comparison of standard assessment methods
Duration	5 hours
Aims:	To give basic knowledge and understanding of assessment methods commonly used in Europe.
Program	1. European Standard ISO 13790, an overview; 2. Calculation method; 3. Boundary condition, climate characteristics; 4. Thermal bridges-simplified calculations; 5. Refurbishment action.
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding.
Name of Unit 2	Life-cycle energy performance evaluation

Duration	5 hours
Aims:	To give basic knowledge on evaluation of energy performance in time and its importance for refurbishment processes
Program	1. Principles of life cycle assessment in the construction sector; 2. Simplified methodology for refurbishment project; 3. Annual energy savings-calculation; 4. Calculation life cycle energy performance; 5. Life cycle energy optimization
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Unit 3	Energy audit in buildings
Duration	5 hours
Aims:	To give basic knowledge on energy audit in buildings
Program	1. Effective tracking of building energy use; 2. Principles of energy audit; 3. Basic calculations of energy loses; 4. Planning energy audit in buildings; 5. Practical advices
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Module 3	Materials science
Name of Unit 1	Basics of building physics
Duration	5 hours
Aims:	To give basic knowledge on energy efficiency and thermal comfort in buildings
Program	1. Heat and mass transport; 2. Hygrothermal behavior in buildings; 3. Ventilation and air quality; 4. Heat energy storage and cooling; 5. Thermal comfort; 6. Environmental profiling of building materials
Methodology	1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding

Name of Unit 2	Materials for improving energy efficiency
Duration	20 hours
Aims:	To give basic knowledge on various categories of building materials, their characteristics and use
Program	<ol style="list-style-type: none"> 1. High performance insulation materials; 2. Phase change materials; 3. Materials for energy efficiency in buildings; 4. Materials skills for building refurbishment
Methodology	<ol style="list-style-type: none"> 1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Unit 3	Systems and devices
Duration	5 hours
Aims:	To give basic knowledge on systems and devices used for improving energy efficiency in buildings
Program	<ol style="list-style-type: none"> 1. Opaque building envelope; 2. Transparent building envelope; 3. Shading devices; 4. Windows: nanogel and energy efficient
Methodology	<ol style="list-style-type: none"> 1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Module 4	Modern technology
Name of Unit 1	Systems and devices
Duration	25 hours
Aims:	To give basic knowledge on modern technologies used in energy efficient buildings
Program	<ol style="list-style-type: none"> 1. Thermal energy storage technologies; 2. Low energy cooling systems; 3. HVAC systems in energy efficient buildings; 4. Energy efficient lighting; 5. Switchable glazing technology
Methodology	<ol style="list-style-type: none"> 1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Module 5	Renewable energy systems

Name of Unit 1	Application of RES in building retrofitting
Duration	45 hours
Aims:	To give basic knowledge on small scale renewable energy systems and devices used in buildings
Program	<ol style="list-style-type: none"> 1. Solar photovoltaic devices and systems; 2. Solar thermal devices and systems; 3. Wind energy for homes; 4. Heating pumps; 5. Micro CHP power generation; 6. Design principles for RES installations
Methodology	<ol style="list-style-type: none"> 1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding
Name of Module 6	Cost control
Name of Unit 1	Cost control of energy effective renovation project
Duration	20 hours
Aims:	To give basic knowledge on costs planning and risk management for building renovation projects
Program	<ol style="list-style-type: none"> 1. Uncertainty in refurbishment investment; 2. Costs of green buildings; 3. Financial benefits of green buildings; 4. Costs optimization;
Methodology	<ol style="list-style-type: none"> 1. Materials provided through e-learning platform. 2. Self-paced e-Learning . 4. Intrinsic quiz at the end of module for checking the acquired knowledge and level of understanding

4. Competence matrix

Core Skills	Module 1			Module 2			Module 3			Module 4	Module 5	Module 6
	Building refurbishment			Assessment and evaluation			Materials science			Modern technology	Renewable energy systems	Cost control
Learning Units	1	2	3	1	2	3	1	2	3	1	1	1
Soft skills												
Ability to transfer of acquired knowledge	X	X	X	X	X	X	X	X	X	X	X	X
Ability to use specific knowledge	X	X	X	X	X	X	X	X	X	X	X	X
Ability to ask appropriate questions and set problems			X	X	X	X		X	X	X	X	X
Ability to problem solving			X		X	X		X	X	X	X	X
Ability to managing people					X	X		X		X	X	
Ability to find additional information and data	X	X	X	X	X	X	X	X	X	X	X	X
Technical/professional skills												
Ability to understand construction services market	X											
Ability to discuss principles and rules in building refurbishment	X		X									
Ability to list and discuss basic standards		X										
Ability to list benefits of energy efficient refurbishment	X											
Ability to understand structural aspects of historic buildings			X									
Ability to evaluate buildings before starting renovation process			X									
Ability to discuss European Standard ISO 13790				X								
Ability to list calculation methods for energy performance				X								
Ability to calculate thermal bridges				X								
Ability to perform life cycle assessment					X							
Ability to calculate annual energy savings					X							
Ability to plan effective tracking of energy use in buildings						X						
Ability to understand simplified methods for projects					X							
Ability to plan energy audit in buildings						X						
Ability to understand principles of energy audit						X						

Ability to discuss basic principles of building physics							X					
Ability to understand hygrothermal behavior							X					
Ability to discuss about heat energy storage and cooling							X					
Ability to list main categories of materials for improving energy efficiency								X				
Ability to choose appropriate materials								X				
Ability to discuss systems and devices used for improving energy efficiency									X			
Ability to choose HVAC systems in energy efficient buildings										X		
Ability to choose appropriate system or devices										X		
Ability to design efficient lighting system										X		
Ability to list and describe small scale renewable energy systems for buildings											X	
Ability to choose appropriate renewable energy solutions											X	
Ability to discuss micro CHP power stations											X	
Ability to design and plan renewable energy installations											X	
Ability to understand benefits of 'green' refurbishment												X
Ability to make costs optimization												X
Ability to understand uncertainty in refurbishment projects												X

5. Evaluation methodology of the Course

The aim of the evaluation process is to determine the suitability of the Course by measuring participants satisfaction level at the end of the pilot training.

Blended learning refers to the arrangement of various media and methods of organizing learning through combining traditional teaching methods with e-learning module accessed via the Internet in form of complex, often hard to navigate LMS platform or simple microsite. Usually the main aim of using blended learning approach is to find balance between online access to knowledge and face-to-face interaction between tutor and learner. From the methodological point of view learning system integrates a combination of guided and self-paced learning scenarios. The entire course was divided into two main parts:

1. Self-paced learning (e-learning mode).
2. Practical face-to-face learning in the form of workshops.

E-learning materials is delivered as one integrated module and students have freely access to it via Internet and browser whereas face-to-face learning part is divided into modules as is shown in the face-to-face learning dossier. E-learning module includes theoretical basis on energy efficient renovation of existing buildings and traditional classroom teaching modules are focused on chosen practical skills that are necessary to use acquired knowledge in practice and develop practical skills. Thanks to that approach we are able to get full integration of theory and practice as a right sequence of learning and teaching activities.

The practical tasks using appropriate templates are designed to link theory with practice within a planning process for buildings renovation and help learners consolidate their knowledge and skills and broaden their view on energy efficient renovation of old and historic buildings. The design of practical tasks to do and part of questionnaire are similar to that used in traditional learning methodology so that the results and learning outcomes enable us to make comparison between traditional and blended learning courses.

For right assessment of blended learning methodology in teaching of building renovation projects theory and practice we need to analyze learners satisfaction level on blended learning as well as teaching outcomes that have been achieved by them. Furthermore, learner satisfaction is a measure of quality of blended learning itself what also enable us to make comparison of two teaching methodologies: traditional and blended learning. Learners satisfaction is defined as their perception pertaining to teaching methods, their previous experience and perceived value of the education received. It is one of the key factors for the success of the ETEROB Project. In our case learner satisfaction level is a combination of four main factors: e-learning environment, face-to-face environment, learner-learner interaction, and learner-tutor interaction.

A questionnaire is designed as a tool for gathering data and information from learners enrolled in ETEROB course that will be used for assessment of satisfaction level. The questionnaire is divided into three main sections:

1. Questions about e-learning module.
2. Questions about practical face-to-face learning module.
3. General questions.

Additional small section gives learners possibility to insert their own ideas about making a possible improvements. Because questions are subjective in their character and a five point Likert scale was used in all questions where learners must indicate the level of their agreement or disagreement. The scale is as follows:

- 5 - Strongly agree
- 4 - Agree
- 3 - Neutral
- 2 - Disagree
- 1 - Strongly disagree

The questionnaire will be administered at the end of course, after it will be completed by learners. All learners should be asked for completion the questionnaire.

6. Supporting documentation

Document	Description
Pedagogy of life-long learning	Osborne M., et al., <i>Pedagogy of Lifelong Learning. Understanding Effective Teaching and Learning in Diverse Contexts</i> , Routledge, 2007
Pedagogical and Design Aspects	Percel K., et al., <i>Pedagogical and Design Aspects of a Blended Learning Course</i> ; Intl. Review of Research in Open and Distance Learning, vol. 10 No. 2, April 2009
Instructional design	Mc Ardle G., <i>Instructional Design for Action Learning</i> , AMACOM, 2010

Website name	Description & link