Innovative Agile Project-based Learning

Agile2Learn

Modular VET Curricula for Agile2Learn Project

Project: 2021-1-CZ01-KA220-VET-000025558
Erasmus+ Program

www.agile2learn.eu

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Project title:	Innovative Agile Project-Based Learning
Project no:	2021-1-CZ01-KA220-VET-000025558
Document information	
Project result:	*R1 – Agile2Learn Curriculum*
Circulation:	*Public*
Author (Organization):	*Name of the leading partner organisation* • *University of Thessaly, Greece (partner)*
Main authors(s):	*Panos Fitsilis, Vyron Damasiotis, Evaggeli Boti*
Final version:	*Name of the organisation contributing to the deliverable* • *EPMA, Czech Republic (Coordinator)* • *University of Thessaly, Greece (partner)* • *Hellenic Open University, Greece (partner)* • *Helliwood, Germany (partner)* • *Consorzio Ro.Ma, Italy (partner)*

Version No.	Date	Description
1	08/06/2022	Draft version
2	08/11/2023	Revised version
3	08/11/2023	Final version

Table of contents

Document

Document Title: Modular VET Curricula for Agile2Learn Project.
Authors/Editors: Panos Fitsilis, Vyron Damasiotis, Evaggeli Boti, University of Thessaly
Keywords: agile methodology, transversal competencies, digital competencies, agile competencies, Vocational education and training, curricula
Abstract: The purpose of this document is to present the Agile2learn curriculum that includes?
a) The Training Courses and
b) Project-based learning

The reader should keep in mind that "Agile2Learn" project employs a staged VET methodology, consisting of a blended learning stage and a project-based learning stage. Therefore, this document provides rich insights for the content design and development, primarily for the blended learning course, but as well for the project-based learning stage.

Introduction

Project **"Agile2Learn"** (project number 2021-1-CZ01-KA220-VET-000025558) is an Erasmus+ KA2/ Innovative project. The Agile2Learn project will develop a curriculum – a codified knowledge to be learned, a set of planned activities influencing teaching and training. This will be used to guide teachers to be more efficient in their educational projects. The aim of the project is professional development through appropriate training of the personnel who work in primary and secondary education. This will be achieved with upskilling them with a complex of skills and knowledge that is required for 21st century learners; such as the Agile2Learn methodology.

The main project's objectives are:

- to define new learning paths
- to offer the opportunity to develop 21st century skills for modern educational environment (and learn these skills in practice)
- to allow learners to work in teams either at a f2f fashion or forming virtual teams
- to allow learners to solve more complex and contemporary problems
- to enable learners and educators to implement educational projects faster, efficiently
- to enable educators to work in teams. This offers significant advantages over traditional educational approaches, which, mostly, deliver educational services in isolation
- to facilitate the usage of modern team collaboration tools

Agile Curriculum Overview

1.1 Curriculum Vision

The rapid changes in the world scene, the pressure in education to harmonize to changes, the teachers' need to adapt to new and emerging techniques, tools and teaching methods, the advent of covid-19 and need of distance learning, the need to

support the dynamic needs of today's students have led to a growing interest in applying Agile methodology in the classroom.
Agile2Learn project directly responds to EU policy documents and programs fostering the following priorities:

- Improving education in transversal competencies.
- Enhance the development of skills and competencies by defining an innovative pedagogical methodology that will rely on the principles and techniques of Agile Project Management and Agile Pedagogy.
- Develop a training curriculum addressed to primary and secondary education teachers in order to apply the new methodology to the school environment and the school curriculum.
- Develop test and validate the proposed methodology.
- Create an innovative culture of training.

1.2 Curriculum Learning Objectives

The proposed curriculum has five major Learning Objectives. These five Learning Objectives are the following:

- LO1: Development of transversal competences
- LO2: Development of Agile competences
- LO3: Development of Digital Transformation competences
- LO4: Developing people and teams
- LO5: Developing an innovative culture of training

Curriculum development research background

The Agile2Learn curriculum includes the development of those skills and competences that were detected:

- as desired ones according to the results of a survey contacted with the academic staff of primary and secondary education of three countries. It was found that there is an increasing interest in the application of innovative teaching methods in order to develop transversal competences and competences for personal and team development both in teachers and students, that are important for the learner of 21st century. Teachers who have applied teaching methods similar to agile methods, as well as those who would like to apply them, have emphasized the need to develop these competences.

- after a systematic review of various European and other organisations' competences frameworks such as LifeComp[1] -The European Framework for Personal, Social and Learning to Learn Key Competence, Digital Competence framework for Educators – DigiCompEdu[2], Digital Competence Framework for Citizens - DigiComp2.2[3], Pedagogical Guide of Digital Competency Framework[4] , etc. and in literature such as Cubric (2013)[5], Paasivaara et al. (2014)[6], Mihalic (2019)[7] Komar's et al. (2020)[8], etc. in order to get an overall view of the competencies that have been developed through the adoption of Agile approach in several case studies
- after the presentation and discussion of the initial set of competences with focus groups teams and discussion between and project partners in order to be selected the most crucial ones that would better fit and serve the aims of the project.

Agile2Learn Competencies

Research in the context of Agile2Learn project has identified three groups of competences. These groups of competencies and *corresponding number* of related skills (*shown in parentheses) are:*

- Agile related (6)
- Transversal (8)
- Digital (7)

The number in the parenthesis indicates the number of specific skills that belongs to this category.

1 Caena, F., & Punie, Y. (2019). Developing a European Framework for the Personal, Social & Learning to Learn Key Competence (LifEComp). Literature Review & Analysis of Frameworks. Luxembourg: Publications Office of the European Union.

2 Redecker, C., & Punie, Y. (2017). European Framework for the Digital Competence of Educators: DigCompEdu. Luxembourg: Publications Office of the European Union.

3 Vuorikari, R., Kluzer, S., & Punie, Y. (2022). DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills, and attitudes. Luxembourg: Publications Office of the European Union

4 Ministère de l'Éducation et de l'Enseignement supérieur. (2020). Pedagogical Guide. Digital Competency Framework. Québec: Gouvernement du Québec.

5 Cubric, M. (2013). An agile method for teaching agile in business schools. International Journal of Management Education, 11(3), 119–131.

6 Paasivaara, M., Heikkilä, V., Lassenius, C., & Toivola, T. (2014, May). Teaching students scrum using LEGO blocks. In Companion Proceedings of the 36th International Conference on Software Engineering (pp. 382-391).

7 Mihalik, J. (2019). Agile Approach in Higher Education-A collaborative research project report. Opus et Educatio, 6(4)

8 Komar, O. A., Chuchalina, Y. M., Kramarenko, A. N., Torchynska, T. A., & Shevchuk, I. V. (2021). Agile Approach in Training Future Primary School Teachers for Resolving Complex Pedagogical Situation. International Electronic Journal of Elementary Education, 13(4), 469-477.

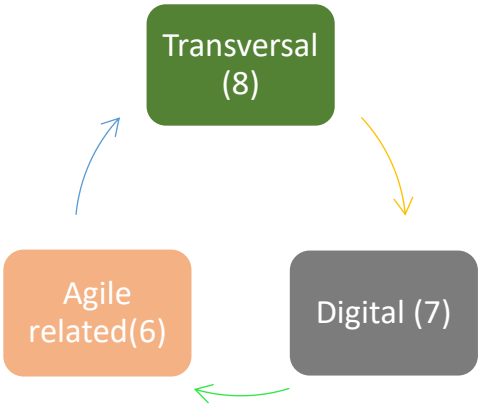

Figure 1: Agile2Learn project competences groups

1.3 Agile competences

Next, we present a foundational suite of agile competencies designed to equip learners with the essential skills and methodologies necessary for understanding and implementing agile methodologies in the field of education.

Table 1. Agile Competences list

No	Skill	Description
1	Agile Methods Fundamentals	SCRUM, KANBAN, LEAN MANAGEMENT, XP
2	Entrepreneurial Thinking	The ability to identify market opportunities and find the most suitable ways to capitalize them using appropriate knowledge and working either individually or collaboratively as a team member having a sense of agency, forward looking and courage.
3	Project Inception (Planning)	Refers to addressing how to complete a project in a certain timeframe, usually with defined stages and designated resources. Usual tasks are defining roles, facilitating communication, enabling effective monitoring, setting measurable objectives, identifying deliverables, Create and perform scheduling, planning tasks etc.
4	Self-Managed Teams	Refers to formation of a group of people who use their diverse skills, knowledge and experience to achieve a common goal by taking the full responsibility for delivering a service or product through peer collaboration without a manager's guidance.
5	Agile Artifacts	Refers to information that stakeholders and the scrum team use to describe a product that's being developed. They define the work that must be done e.g.: Product backlog, scrum backlog, product increment.
6	Agile Ceremonies	Agile ceremonies are periodic meetings held to ensure that projects are on time and meeting quality goals. E.g. in SCRUM these are: Sprint, Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective.

1.4 Transversal competencies

A large number of the proposed competences/skills[9] of 21th century learners should be transversal. According to UNESCO UNEVOC Glossary (https://unevoc.unesco.org/go.php?q=TVETipedia+Glossary+A-Z&id=577)
Transversal skills are those typically considered as not specifically related to a particular job, task, academic discipline, or area of knowledge but as skills that can be used in a wide variety of situations and work settings. These skills are increasingly in high demand for learners to successfully adapt to changes and to lead meaningful and productive lives.
The following table identifies the proposed set of skills as they were identified by Agile2Learn research initiative. The selection of a core set of Transversal skills is quite challenging since numerous frameworks are in use, the definition of the competences is not rigid leading to overlapping, etc. However, the following list will be validated in a number of ways (e.g. Agile2Learn focus groups, SC experts) so to be proved useful and appropriate at the domain of education.

Table 2. Transversal Competences list

No	Skill	Description
1	Communication	To understand the codes, rules, techniques and barriers of a communication in different environments and situations.
2	Creativity	To think about a task or a problem in a new or different way and to find connections between different ideas and use those connections to solve problems. Design thinking is a non-linear, iterative process which seeks to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test. The method consists of 5 phases—Empathize, Define, Ideate, Prototype and Test and is most useful when tackling problems that are ill-defined or unknown.
3	Teamworking	The collaborative effort of a group to achieve a common goal or to complete a task in the most effective and efficient way taking into consideration individual strengths and diverse perspectives).
4	Social Skills	A social skill is any competence facilitating interaction and communication with others where social rules and relations are created, communicated, and changed in verbal and nonverbal ways. Examples of social skills are effective communication, conflict resolution, active listening, empathy, etc.
5	Handling Ambiguity	• The ability to deal with ambiguous situations in a sensible and systematic way. It is directly related to risk management. • According to EntreComp this skill is similar to "Coping with uncertainty, ambiguity and risk". It includes: • Make decisions when the result of that decision is uncertain, when the information available is partial or ambiguous, or when there is a risk of unintended outcomes.

[9] Generally, the term "skill" is more specific and is related with the ability to execute a task. Contrary, the term "competence" is more generic and broader as it might include skills, knowledge and abilities. However, in this document these two terms are used interchangeably.

		• Within the value-creating process, include structured ways of testing ideas and prototypes from the early stages, to reduce risks of failing. • Handle fast moving situations promptly and flexibly.
6	Critical Thinking	Actively and skilfully conceptualizing, applying, analysing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication).
7	Problem Solving and Decision Making	Problem-solving skills help you determine the source of a problem and find an effective solution. Some key problem-solving skills include: • Active listening • Analysis • Research • Creativity • Communication • Dependability • Decision making • Team-building Decision making is the ability to think objectively and relate concepts in order to choose between alternatives.
8	Time Management	The ability to use the time productively and efficiently by prioritizing and scheduling what needs to be done to achieve.

1.5 Digital Competencies

Next, we present a set of digital competencies that have been specifically chosen to empower learners to utilize digital tools and by that way to enhancing their ability to apply agile methodologies with greater effectiveness and efficiency. The selected competences aim to bridge the gap between agile practices and digital technology, ensuring that learners are equipped with the knowledge and skills necessary to navigate and excel in a technologically advanced, agile-centric educational landscape.

Table 3. Digital Competences list

No	Skill	Description
1	Digital collaboration at professional and learning level	To use digital technologies to collaborate.
2	Selecting digital resources	To identify, assess and select digital resources for teaching and learning. To consider the specific learning objective, context, pedagogical approach, and learner group, when selecting digital resources and planning their use.
3	Creating and modifying digital resources	To modify and build on existing openly licensed resources and other resources where this is permitted. To create or co-create new digital educational resources. To consider the specific learning objective, context, pedagogical approach, and learner group, when designing digital resources and planning their use.
4	Managing, protecting and sharing digital resources	To organize digital content and make it available to learners, parents, and other educators. To effectively protect sensitive digital content. To respect and correctly apply privacy and copyright rules.

		To understand the use and creation of open licenses and open educational resources, including their proper attribution.
5	Actively engaging learners	To use digital technologies to foster learners' active and creative engagement with a subject matter. To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression.
6	Digital content creation	To incorporate learning activities, assignments and assessments which require learners to express themselves through digital means, and to modify and create digital content in different formats. To teach learners how to copyright and licenses apply to digital content, how to reference sources and attribute licenses.
7	Digital problem solving	To incorporate learning activities, assignments and assessments which require learners to identify and solve technical problems, or to transfer technological knowledge creatively to new situations.

Curriculum Delivery Guidelines

1.6 Curriculum delivery models

The proposed curriculum is structured around two different delivery models. These delivery models are: Blended learning, and a project-based learning stage.

- The blended learning approach combines online educational materials and opportunities for interaction online with traditional place-based classroom methods. It requires the physical presence of both teacher and student, with some elements of student control over time, place, path, or place. As such blended learning approach will be used for the Agile2Learn Training Course, in order primary and secondary teachers acquire the basic competencies and it will combine e-learning and face-to-face lectures.
- In parallel with the other two delivery modes, Agile2Learn social partners in each country will identify a pool of stakeholders willing to be trained during their project-based learning stage as well as to develop their skills in order to apply Agile PBL in the classroom in order to properly manage any national and transnational educational project.

1.7 Agile2Learn Curriculum Structure

Agile2Learn curriculum structure has two basic stages. These stages are:

- Training courses delivery phase and
- Project-based learning and Agile learning phase

Overall, these phases could be overlapping, however in the context of Agile2Learn project the sequence is demonstrated in figure 1.

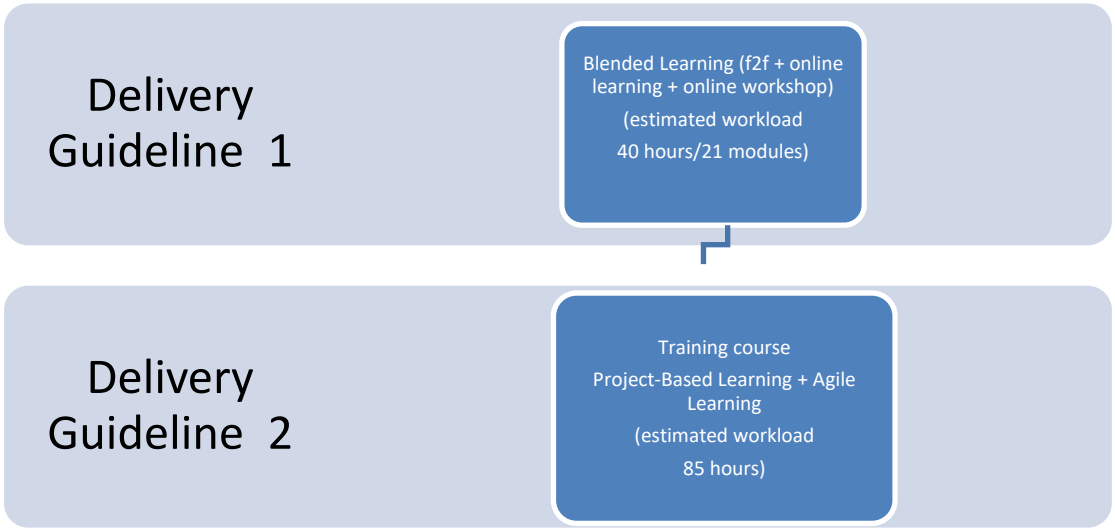

Figure 1. Agile2Learn training scheme

The suggested workload is meant to serve as a flexible guideline and may be tailored to align with the trainee's current level of knowledge, comprehension, and degree of familiarity with agile methodologies. This adaptable approach ensures a personalized learning experience, allowing for adjustments that cater specifically to the individual's educational needs and pace.

Guideline 1 - The delivery of the training course piloting that will last 8 weeks.
Guideline 2 - Project based learning and Agile Learning that will last 16 weeks, approximately 5h of work in the placement / week

1.8 Guideline 1 – Delivery of training course (Blended learning)

The blended course will last 8 weeks, around 40 hours, and includes face-to-face workshops/tutoring meetings (12 hours), and online learning materials and tools for interaction including self- study. It will be delivered in the first 2 months of the piloting phase. The certificate of course attendance will be issued only upon the completion of the full training including the project work. The Blended learning consists of three phases:

- Phase1: Introductory
- Phase 2: Specific to Agile learning
- Phase 3: Specialized Knowledge

The following are the competences – skills, 21 in number, will be delivered in three phases through Blended Learning

Table 4. Module distribution to Phases

Phase 1 (Introductory)	Phase 2 (Specific to agile learning)	Phase 3 (Specialized knowledge)
AGILE (Agile Methods and Fundamentals) (AGILE) Project Inception (Planning) (AGILE) Self-Managed Teams	(AGILE) Agile Artifacts (AGILE) Agile Ceremonies	
(TRANSVERSAL) Communication (TRANSVERSAL) Teamworking	(TRANSVERSAL) Creativity (TRANSVERSAL) Time management (TRANSVERSAL) Problem-solving and decision making	(TRANSVERSAL) Handling Ambiguity (TRANSVERSAL) Critical Thinking (TRANSVERSAL) Entrepreneurial Thinking (TRANSVERSAL) Social Skills
(DIGI) Digital collaboration at professional and learning level	(DIGI) Selecting digital resources (DIGI) Creating and modifying digital resources (DIGI) Managing protecting and sharing digital resources	(DIGI) Digital problem solving (DIGI) Actively engaging learners (DIGI) Digital content creation

The training of VET learners consists of 3 parts:

- Providing the knowledge to teachers
- Application of the knowledge to teachers
- Evaluation done by teachers.

Each module has its own way to be implemented it (activities / exercises / games / projects / Agile methods) and it will be in 2 ways to be transferred properly.

- The level of the teacher
- The level of the project manager

There will be two (2) learning pathways to be delivered:

- **Agile as a pedagogical tool:** Enhancing Student Learning and Collaboration. In this pathway, the focus is on utilizing agile strategies as powerful pedagogical tools to elevate students' learning experiences and foster collaboration. Embracing the agile philosophy, educators continuously adapt their teaching methods to meet the evolving needs of their students. This approach is marked by early and continuous feedback, a willingness to incorporate changes even late in the learning cycle, and a commitment to iterative improvement.
- **Agile as a school development tool** which helps in producing a holistic educational transformation. In this pathway, the focus shifts towards leveraging agile methodologies as powerful tools for school-wide development and transformation. Educators are equipped with the skills and knowledge needed to plan, collaborate, and reflect on the design and delivery of school curriculum units continually. This approach transcends individual classrooms, impacting the entire school environment.

Table 5. Structure of training course

<table>
<tr><td>Agility</td><td colspan="6">Becoming agile through applying agile methods</td></tr>
<tr><td>Learning Stage</td><td colspan="3">Build up knowledge</td><td>Practice/Deep dive</td><td>Creation</td><td>Retrospective</td></tr>
<tr><td>Phase</td><td>1st phase</td><td>2nd phase</td><td>3rd phase</td><td>4th phase</td><td>5th phase</td><td>6th Phase</td></tr>
<tr><td>Topics</td><td>Introductory knowledge</td><td>Specific knowledge</td><td>Specialised knowledge</td><td>Concepting and exchanging through Community of Practice platform</td><td>Exploring agile method within the participant's workplace</td><td>Reflection on followed activities and actions.</td></tr>
<tr><td>Learning format</td><td colspan="3">E-learning</td><td colspan="2">Implementation of agile methods in:
• teaching – in the classroom
• working with colleagues
• provide agile based cases and exercises to students</td><td>Sharing experience with the community members</td></tr>
<tr><td rowspan="2">Length of the training</td><td>10 - 12 hours</td><td>14 - 16 hours</td><td>12 - 14 hours</td><td colspan="3" rowspan="2">85 hours</td></tr>
<tr><td colspan="3">40 hours in total</td></tr>
<tr><td colspan="7">Continuous online support of trainees</td></tr>
</table>

1.9 Guideline 2 - Project-based Learning

Project-Based Learning / Agile Learning	**Partners**
Project-Based Learning and Agile Learning will last 16 weeks, approximately 5,5h of work in the placement / week (totally 85h) • B1: Work placement • B2: Assessment	
Additional training (f2f) activities for Trainers, Employers and Learners	
• C1: A 5-days Short-term joining staff training Event for training the Trainers	

Modules educational design

The design of the educational module requires, for each competence, the use of a specific template. This template, which will be instantiated for each competence/module, will facilitate the development of training materials in a systematic and consistent manner.

TB1: COURSE MODULE DESCRIPTION		
1	Course Module code	*Course Module code. Module codes to be used are:* • *Digital* • *Agile* • *Transversal*
2	Course Module title	*Title of Course Module*
3	Course Module description	*Description of the module (up to 100 words)*
4	Knowledge domain	*Knowledge domain of the module*
5	Learning objectives	• *Learning objectives (4 up to 10) for the specific course module*
Learning outcomes for the Cognitive domain+ (Bloom Taxonomy)		
Code	**Learning Outcome** (please underline the verb and the concept of the knowledge domain used) Upon completion of this module, the learner will be able to:	
1. Knowledge level		
LOut1	(use verbs according to bloom taxonomy)	
LOut2		
2. Comprehension level		
3. Application level		
4. Analysis level		
5. Synthesis level		
6. Evaluation level		

Unit Code*,**	**Unit title**
ModuleCode.1	*This corresponds to a unit/ learning object*
ModuleCode.2	
ModuleCode.3	

(*) A unit (learning activity) should be approximately 1-2 hours of study.
(**) For each Unit specified above please fill in a Table TB2

The Bloom taxonomy to be used is presented in the next page.

Level	Definition	Sample verbs					Sample behaviors
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	arrange define describe duplicate	identify label list match	memorize name order outline	recognize relate recall repeat	reproduce select state	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	explain summarize paraphrase describe illustrate classify	convert defend describe discuss distinguish estimate explain	express extend generalized give example(s) identify indicate	infer locate paraphrase predict Recognize	rewrite review select summarize translate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	use compute solve demonstrate apply construct	apply change choose compute demonstrate discover dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will write an instructional objective for each level of Bloom's taxonomy.
ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question	analyze categorize compare contrast separate apply	change discover choose compute demonstrate dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will compare and contrast the cognitive and affective domains.

SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	create design hypothesize invent develop arrange assemble	categorize collect combine comply compose construct create	design develop devise explain formulate generate plan	prepare rearrange reconstruct relate reorganize revise	rewrite set up summarize synthesize tell write	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify Appraise Argue	Assess Attach Choose Compare Conclude Contrast	Defend Describe Discriminate Estimate Evaluate Explain	Judge Justify Interpret Relate Predict	Rate Select Summarize Support Value	The student will judge the effective- ness of writing objectives using Bloom's taxonomy.

Modules inventory

The design of all modules is fully described in TB1, TB2, TB3, TB3a, TB3b documents. These documents can be found in the following annexes:

Annex I: Description of each module structure - TB1 documents.

Annex II: Description of structure of each unit within a module - TB2 documents.

Annex III: Description of the educational materials in each module's unit - TB3 documents.

Annex IV: Assessment - Multiple choice questions per module -TB3a documents.

Annex V: Assessment - Practical assignment per module - TB3b documents.


EPMA
EUROPEAN PROJECTS
& MANAGEMENT


UNIVERSITY OF
THESSALY


HELLENIC
OPEN
UNIVERSITY


HELLIWOOD


Consorzio Roma