IO3: Development of Educational Content and Relevant Guidebooks

Prepared by CUBEIE LCC

ENGineering and INdustry Innovative Training for Engineers (ENGINITE)

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Consortium

This document has been produced by the consortium of the ENGINITE project

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Executive Summary

This Output includes the overall work that has been done regarding the design and the development of the Educational Content of the ENGINITE Training Programme, which is consisted of the educational training programme, the Guidebook for Trainers that will help all interested trainers to deliver the course that will be developed, the Guidebook for Mentors, and the Programme Specifications.

The output consists of six tasks, hereby briefly presented:

T1: Specification of the eight immediate courses to be enacted and allocation to the consortium partners according to their expertise

T2: Development of the above-mention eight complete courses, along with detailed lesson plans by each partner according to the Programme PBL way

T3: Development of a completed and comprehensive guidebook for the trainers under the license of creative commons – the Guidebook for Trainers

T4: Development of a guidebook for mentors regarding the philosophy and the content of the structured internships – the Guidebook for Mentors.

T5: A Train the Trainers training activity took take place in Greece so to train the partners on the entire ENGINITE Training Programme developed

T6: Development of the Programme Specifications, a document that overall presents the philosophy of the Program and disclosure important insights of it. This is an important document that will be also used for the promotion of the ENGINITE programme and for the attraction of interested companies and engineers.

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Table of Contents

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1. Introduction

The Intellectual Output 3 aims to design and develop the Educational Content of the ENGINITE Training Programme, which is consisted of the educational training programme, the Guidebook for Trainers that will help all interested trainers to deliver the course that will be developed, the Guidebook for Mentors and the programme specification.

CUBEIE according to their experience and their previous studies on the market analysis results indicated and initiated eight modules/courses that were developed aiming to tackle the needs of the main target groups. The design and development of the eight courses (curriculum) is be fully consistent with the PBL/VET pedagogy.

The courses were allocated to the partners for development according to their background and expertise. The development of each course is all-inclusive and involved curriculum development, reading material, presentations, workshops, resources, and other material needed for running a training programme.

Additionally, details of the eight courses and curriculum material such as video tutorials, slideshows, and examples of activities will continue to be incorporated at the project's Online Platform (which will be developed on the IO4) using open access policy, making the content available to everyone under the license of creative commons.

The ENGINITE Training Programme will last 6 months and will be divided into two parts:

- PART 1 - Intensive training programme focused on employability enhancement, managerial skills and technical knowledge - 3 months blended learning (1 month online + 2 months face to face (cumulative))
    - Part 1A – Employability enhancement & managerial skills (4 courses) (1 week online + 1-month face to face)
    - Part 1B – Technical knowledge enhancement (4 courses) (1 week online + 1-month face to face)

- PART 2 (3 months): Structured internship for accelerating hands-on experiences in the industry

The ENGINITE Training Programme will be delivered in English and after its pilot testing in the frameworks of IO4, it will be translated in Greek.

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2. Task 1: Specifying the ENGINITE modules

CUBEIE indicated and initiated eight modules/courses aiming to tackle the needs of the main target groups. The courses were allocated to the partners for development according to their background.

The table below presents the eight courses and the partner of the consortium who is responsible for the design, the development and the improvement of each course.

Table 1: Courses titles and responsible partner

A	Employability Enhancement & Managerial Skills	Responsible Partner
A1	Applied Efficient Quality and Health & Safety Management Systems	TUC
A2	Innovation, Entrepreneurial and Intrapreneurial skills	GrantXpert
A3	Engineering Systems Thinking: Re-engineering by Simplifying	CUT
A4	Project Management in Action	CUBEIE
B	Technical Knowledge Enhancement	Responsible Partner
B1	Engineering economics	CUT
B2	Product development. From concept to market	CUT
B3	Applied Process and Production Optimization	TUC
B4	Engineering Logistics and Supply Chain Analysis in practice	TUC

In addition, the Syllabus of the ENGINITE Courses and relevant Information was prepared by CUBEIE and completed by all responsible partners. The description of the courses, the learning outcomes as well as the analysis of the envisage blended learning concept were fully prepared by CUBEIE. Then, after CUBEIE's guidelines and structured outlines, all partners extent the Syllabus by adding the requirement material equipment, the problem-based learning problem scenarios and relevant references. All the previous courses Syllabus were combined in a comprehensive report prepared by CUBEIE. In this report, the final Syllabus for all courses includes the followings:

i. Courses Description
ii. Key learning outcomes:
iii. Course Material / Software
iv. Assessment (to be updated after the PBL training)
v. Problems/ Case studies
vi. Preparation
vii. References

The Syllabus was essential for the preparation of each partner regarding the Training (C1) of the PBL methodology which took place in March 2018 in London, UK.

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3. Task 2: The fully-developed ENGINITE modules

Following the allocation, all partners developed the courses they were responsible for, along with detailed lesson plans. The lesson plans include the objectives, the means and the activities that can be followed for each course following the PBL pedagogy framework illustrated in the guidebook for PBL methodology of the Output 2. This task has as its main result the development of the ENGINITE Training Programme.

Analytically, each partner provided the following parts for its course, that are eventually part of the task entitled 'the Guide for Trainers' as is mentioned below:

Part A - General course information - Contains information on: keywords, authors, duration, language of materials, type and number of sessions, number of participating engineers and group setting.

Part B - Module overview and Key Learning Outcomes - An overview of the course, a complete list of learning outcomes and a description of software needed to deliver the course.

Part C - The learning scenario - Describes the problem context within which the trainees will be working, with background reading to help the trainer familiarize themselves with this area. Includes photos that can be used as media in training sessions.

Part D - Pre-module preparation - Provides lists of materials that could be used as background reading and additional case study material.

Part E - Module overall presentation - Refers to the PowerPoint presentation used to deliver the course and provides a suggested list of discussion questions.

Part F - Post-module (post training) - Provides a list of reflective questions that instructors can use to help trainees assess their level of understanding. It also provides details of any outputs that the trainees will need to produce.

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4. Task 3: Guidebook for Trainers

Additionally, a comprehensive guidebook entitled 'GUIDEBOOK FOR TRAINERS' has also been prepared for the trainers under the license of creative commons. The guidebook includes all the material of the Guidebook for the PBL methodology as well as the outline for the courses and the detailed lesson plans that were developed on the previous task.

The aim of this guide is to provide all the necessary guidance to the ENGINITE trainers in order to be able to deliver the ENGINITE modules that were assigned to them. It is noted that the guidebook should be read in conjunction with the ENGINITE Programme Specifications.

Specifically, the guidebook begins with an overview of the Problem-Based Learning (PBL) approach, explaining its differences from the traditional teaching and learning approach and the motivations it has for the learners.

The second part of the guide gives trainers/instructors/facilitators 12 principles for delivering effective the PBL methodology. The philosophy of PBL differs from other traditional teaching methods in which the trainer is considered as the holder of wisdom and knowledge that needs to be transferred to the learner. In PBL, the trainer is considered as a facilitator and his/her mission is to help the learners identify and solve the problems that are important to them. This philosophy has far-reaching consequences for how training is delivered in practice. The principles provided in this book are intended to help trainers adopt teaching practices that align with how PBL is being used in the ENGINITE programme.

In the third part of this guidebook a standard process for running a daily reflective exercise with groups is descripted. This is intended to be a process is to be used by all instructors to establish the importance of reflection as part of learning.

The aforementioned information is analytically descripted on the **'GUIDEBOOK FOR TRAINERS'** in a separated document which prepare by ThinkUp and reviewed by CUBEIE.

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5. Task 4: Guidebook for Mentors

The guidebook for mentor mentors provides essential instructions regarding the management of the internship placement, securing both work-based learning and contribution to the company.

The aim of this guidebook is to support the mentors who will guide the ENGINITE participant engineers during their 3-month structured internship placement in an engineering company.

The guidebook gives an overview of the ENGINITE programme, including the preparatory courses that the participants will complete before they begin their placement. It then provides suggestions about ways they can support the participants during their placements.

Specifically, , the two parts of the guidebook include:

- Part 1 - Introduction
  - What is ENGINITE?
  - Participants' preparation for their structured internships
  - Aim of the Structured Internships
  - What a participant can get out of a placement
  - What will the participant be doing?
- Part 2 - What is expected of you (the Mentor)
  - Getting started in the company
  - Finding their own project - setting a target
  - Reflective learning during their project

The aforementioned information is analytically descripted on the '**GUIDEBOOK FOR MENTORS'** in separated document which prepare by ThinkUp and reviewed by CUBEIE.

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6. Task 5: Train the trainers activity

As part of the Output IO3, the Train the Trainers training activity (C2) that took place in Chania, Greece on June, 2018. The aim of this learning activity was to train the partners on the whole ENGINITE Training Programme that was developed.

Specifically, the partners of the ENGINITE project needed to be trained on the whole training programme, in order to be able to organize and implement the pilot testing in their countries and deliver to participants all the Training Programme successfully. The training was done effectively by the persons that have developed it. To this end, the face-to-face "Train the Trainers workshop" was one of the most crucial stages of the project, since it facilitated the transfer of knowledge and clarified various important issues, before the actual training takes place in each country.

The training took place after the development of the first draft of the ENGINITE Training Programme and specifically during the 3rd coordination meeting of the consortium. The Train the Trainers workshop lasted 3 days (12-14 June 2018) and its key features are mentioned bellow:

- The main aim of this Workshop was to train the people who will be involved as trainers in the pilot training program that will be organized in each participating country.
- The trainers had the opportunity to evaluate the training programme, to exchange ideas, knowledge and methodology as well as to give a constructive feedback to each others.
- Partners who were responsible to develop modules for the training programme were acting involved as trainers and as trainees at the same time.
- Each one trained the others in the subject matter that has an expertise and for which he/she was responsible to develop the training content. This helped the trainers to better understand the project, its structure and methodology, to ensure that the training material is coherent and that there is no overlapping.
- The Train the Trainers workshop was based on the key learning outcomes, the power point presentations of the training programme and the in-depth analysis of the problem/learning scenarios. Also, a crucial and constructive interactive feedback session was established for each course focusing in the planted PBL approach, in the forming of the problem, the content as well as the quality of each course.
- A ‘live’ simulating session took place with hands-on advices on how to initiate and employ an ENGINITE PBL course. The session was a great opportunity to finalize each of the courses and secure the most out of the training sessions.

It must be highlighted that for a number of courses, we may invite instructors from the industry to deliver them if this is needed and if this will have a greatest value for the project. Thus, the in-house instructors who

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participated in the Train the Trainers training will be responsible to train the invited industrial instructors on the training programme developed.

It should be noted that, all courses material were prepared accordingly and uploaded on the ENGINITE online platform which prepare by CUT and GrantXpert. Therefore, during the training the training all participant has the chance to be familiarized with the platform interface and relevant functions.

After the activity was completed, each course was finalized and the next task took place and that is the completion of the Programme Specifications.

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7. Task 6: Programme Specifications

According to our proposal, this section provides information about the programme specifications for the interested Engineers and Companies: description of the programme, the expected learning outcomes etc. for the recruitment of both target groups, the interested companies and the young engineers.

The last task of this Output is the development of the Programme Specifications for the interested Engineers and Companies. This document includes important elements such as the extensive description, the expecting learning outcomes, the skills which need to be developed, as well as an explanation of the PBL methodology and its effectiveness in Engineering Education. This document will also be used for the promotion of the ENGINITE programme and for the attraction of all interested companies and graduate engineers.

The Programme Specifications consists of two parts that are outlined below:

- PART 1: The ENGINITE courses: Overview & learning goals
    - Teaching Methodology
    - Blended learning
    - Duration
    - Team working
    - Assessment
    - Duration & indicative timetable
    - Learning gains & expected outcomes
    - Certificates
- Part 2 - Overview of courses
    - Employability Enhancement & Managerial Skills
    - Technical Knowledge Enhancement

The aforementioned information is analytically descripted on the **'PROGRAMME SPECIFICATION** in separated document which prepare by ThinkUp and reviewed by CUBEIE.

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8. Conclusion

In concludes, the Output 3 of the ENGINITE project have been successfully completed, by delivering all proposed documents and in the planned time frame. All relevant proposed tasks completed by the responsible partner in high quality and in a professional way. It should also be noted that, the output guidebooks (deliverables) will be updated and adjusted accordingly after the implementation of the ENGINETE pilot testing and by taking into account both, the constructive feedback and the relevant results. After the completion of the ENGINITE Pilot testing, the final version of the deliverable guidebooks will be uploaded on the ENGINITE website and will be available for free for all interested parties.

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