D3.3 ONLINE TRAINING OF ACADEMIC PERSONNEL

WP3 DEVELOPMENT AND ACADEMIC STAFF TRAINING

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Project Information

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Table of Contents

List of figures

Executive Summary

This report defines the technical and contextual specifications for the APPLY Online Training Platform.

Contextual requirements concern the key features of the APPLY Online Training Platform, including building blocks of the APPLY Professionals/VET courses (MOOCs) architecture, course structure, assessment and certification, collaborative mechanisms, users' communication, accessibility, roles and enrolment.

Technical requirements concern the software specifications of the Online Training Platform, including IT architecture, software components, installation prerequisites, software prerequisites, course content format and specifications.

1. Introduction

The objective of this report is to present the supplemented material following the training courses targeting the teaching staff intended to deliver the APPLY academic programme and administrative staff intended to manage the programme. This material was structured in the form of a self-paced course under the title "APPLY ACADEMIC STAFF TRAINING". The course is accessible through this link https://vle.apply-project.eu/courses/course-v1:apply+04+2022/about. It aimed (and still aims) to build the skills, knowledge and expertise of the APPLY Consortium Partner Higher Education Institutions based in Malaysia, Cambodia and Thailand by transferring of experience and good practices from the APPLY EU Higher Education Institutions.

The APPLY project aims to improve the quality of higher education and enhance its relevance for labour market and society. The APPLY aims to develop new specialized curricula and an innovative MSc programme on Computational Fluid Dynamics thus helping build the capacity of the partner countries'(PC) HEIs, improve the level of competences and skills offered, and address the existing absence of a similar programme. The APPLY project will also promote cooperation, exchange of know-how and good practices in the subject area between EU and PC HEIs. Viable synergies and links with the regional engineering-related industries will be establish in order to address their needs in specialized personnel in APPLY, training needs and enhance the employability of APPLY graduates.

The APPLY MSc Programme aims to :

- organise industry placements in relevant businesses, government agencies, etc.
- offer digital learning, to allow modern, self-paced forms of learning, as well as to enable contribution from experts across the globe in the development of the program.
- promote cooperation, exchange of know-how and good practices in the subject area between EU and Asian Higher Education Institutions.
- establish viable synergies and links with the regional industry in order to address their needs in specialized personnel and enhance the employability of APPLY graduates.
- contribute to local economic growth, by providing to program participants the right knowledge/skills/tools to turn the local engineering sector into a driver of social and economic growth.

2. APPLY Academic Staff Training online Course

2.1.About the Course

In the realm of engineering and scientific research, Computational Fluid Dynamics (CFD) stands as an important tool in the design and analysis of various systems. Its applications pertain to various engineering sectors including manufacturing, aerospace, automotive and extend beyond to environmental and biomedicine. Recognizing its significance, there is a growing demand for proficient CFD practitioners in academia and industry alike.

This course aims to equip the APPLY academic staff members with the requisite skills and knowledge to exploit the potential of CFD. By doing so, it seeks to inform on the advancements in fluid dynamics research and applications across diverse fields.

To this end, this course will facilitate the exchange of knowledge and experiences offered by the APPLY EU Higher Education Institutions (Cranfield University, Universitat Politècnica de Catalunya and University of Patras). It will provide academic staff with the skills, resources, and networks necessary to excel in the realm of Computational Fluid Dynamics, and cultivate a new generation of CFD practitioners by investing in the professional development of educators and researchers.

2.2.Learning objectives

The core learning objectives are:

- Understanding the core ideas and definitions of CFD.
- How to introduce the necessary technical skills for CFD applications.
- The importance of soft skills and how to cultivate them
- How to approach interdisciplinary teaching.
- How to model real world applications into CFD problems.
- The importance of open-source software and community-based groups.
- How to foster creativity and an innovative mindset.
- How to be more mindful and reflective in your teaching preparation, approach and practice.
- Generating interest in STEM subjects via an interactive learning journey.
- How to be a leader in Engineering Educational contexts.
- Insights into high performance computing.

3. Course design and development

3.1.Course Structure

The course content is based on the training activities that were done during online training workshops and face-to-face training sessions. The contents were identified during these capacity-building activities and was inline with the training needs of the participants. In addition during the curriculum development phase many of these topics acquired close collaboration and elaboration, thus it was decided to include complicated issues that could help instructors in the long term. The content was structured around two main pillars:

- APPLY MSc courses, where carefully selected topics are presented in the form of slides, notes or even video lectures.
- A webinar section, containing pre-recorded lectures with Q&A sessions between EU experts and Academics from the India, Thailand and Malaysia.
- Additional material addressing research and instructional design related topics in the CFD field.

Specifically for the APPLY MSc courses, co-developed by the partnership, the following elements are addressed:

- Teaching challenges and strategies to address specific learning objectives on course or even topic level depending on the complexity of the teaching material.
- Lab-related instructions and hands-on teaching approaches
- Preparation methodology for preparing students for delivering a CFD-driven thesis
- Creating synthetic projects including simple multi-course assignments
- Incorporating complementary teaching methodologies through a course duration including lectures, worked examples, tutorials, supervised workshops and independent works. The target is to find the right balance between teacher-centered style and student-centered style.
- Providing pre-requisites since the APPLY MSc contains highly interconnected courses and learning objectives.

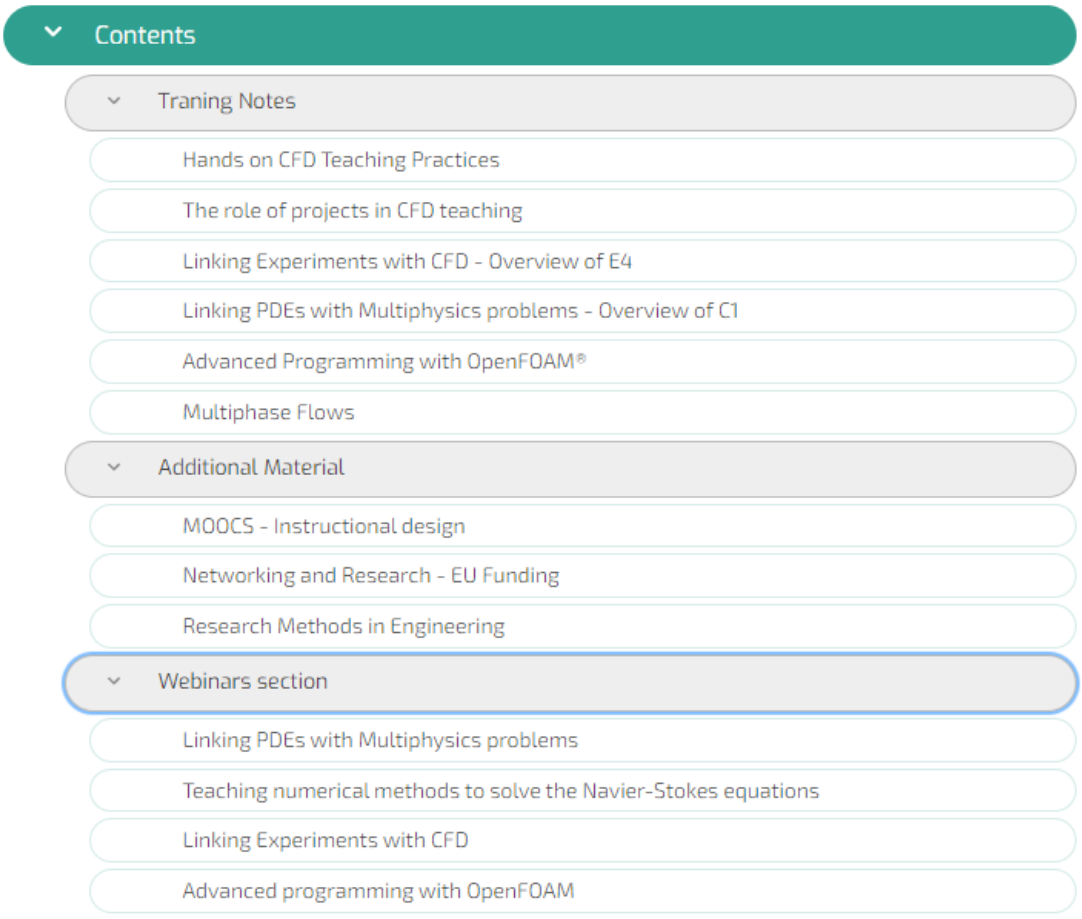

Figure 1 Structure of APPLY Academic Staff Training course

Section 1 – Teaching notes and elaboration teaching approaches on specific APPLY MSc topics

The training notes are covering the following topics:

- *Hands on CFD teaching practices* including physical problem formulation and mathematical modelling and employment of related software (commercial or open source).
- *The role of projects in CFD*, combining different expertise including fluid mechanics, numerical methods and computer programming.
- *Linking experiments with CFD*, focusing on engaging lectures with consistent interaction ensuring rapport with students, combining hands-on training and experimental work and elaborating on effective formative and summative assessment approaches allowing students to evidence the learning outcome.
- *Linking PDEs with Multiphysics problems*, targeting basic skills in numerical methods for Partial Differential Equations and resulting in interpreting complex problems as a composition of simple physical mechanisms.
- *Advanced Programming with OpenFOAM,* presenting best use practices on the famous open-source software (C/C++ technology) and common utilities such as blockMesh, snappyHexMesh, programming with codeStream, etc).
- *Multiphase flows,* presented as teacher notes and covering fundamental and advanced or complicated topics.

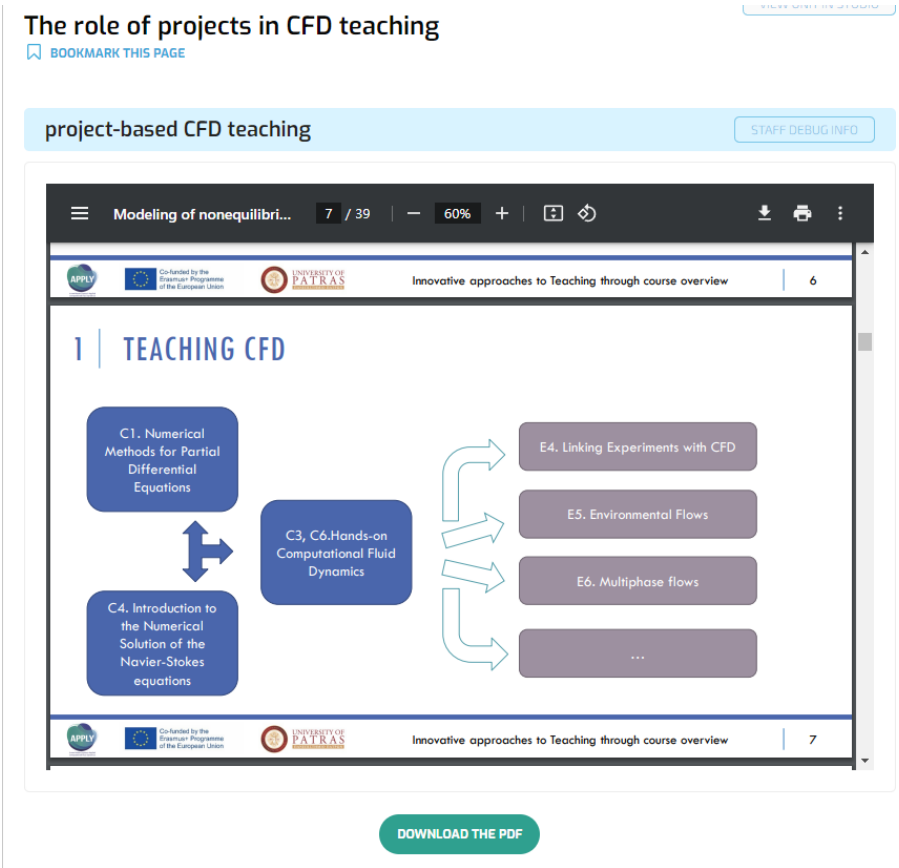

Figure 2 Notes on project-based CFD Teaching

Section 2 – Additional Material

The Additional material targets not only instructors but also content developers, technicians and administrative staff especially focusing on EU funding opportunities. Topics in this section include Instructional design methods for delivering courses in the APPLY MOOC platform after the project ends, research methods in engineering and in funding EU funding schemes (58 slides in total).

Figure 3 Populating online courses (APPLY LMS) with complementary elements

Section 3 – Webinars

The webinars sections took place in the first phase of the project in an effort to tackle cancellation of travels due to COVID19 restrictions. The webinars were driven by the EU partners while Asian partners

provided their feedback on how they plan to run the APPLY MSc programme in their institutions. The webinars targeted specific training needs as these rose during the curricula development process. The webinars took place in August 2022 and covered 6 hours of training on specific topics of the APPLY MSc.

APPLY Online Training Seminar Agenda

DAY 1: 08/08/2022		
Time (UK)	**Presentation title**	**Delivery**
9 :00 – 9 :55	Course overview for C1 - Linking PDEs with Multiphysics problems	University of Patras
10 :00 – 10 :55	Advanced Programming with OpenFOAM	University of Patras
11 :00 – 11 :55	Implementation of APPLY Program at Chiang Mai University	Chiang Mai University

DAY 2: 09/08/2022		
Time (UK)	**Presentation title**	**Delivery**
9 :00 – 9 :55	Course overview of E4 - Linking Experiments with CFD	Cranfield University
10 :00 – 10 :55	Teaching numerical methods to solve the Navier-Stokes equations	Polytechnic University of Catalunya
11 :00 – 11 :55	Implementation of APPLY Program at Naresuan University	Naresuan University

Time Zone Conversion Table					
UK time	**Spanish time**	**Greek time**	**Thailand**	**Malaysia**	**India**
9:00 - 09:55	10:00 - 10:55	11:00 - 11:55	15:00 - 15:55	16:00 - 16:55	13:30 - 14:25
10:00 - 10:55	11:00 - 11:55	12:00 - 12:55	16:00 - 16:55	17:00 - 17:55	14:30 - 15:25
11:00 - 11:55	12:00 - 12:55	13:00 - 13:55	17:00 - 17:55	18:00 - 18:55	15:30 - 16:25

Figure 4 APPLY training workshop agenda

The recorded lectures are accessible through the APPLY VLE and cover:

- Core 1 Course – Linking PDEs with Multiphysics problems (Prof. Polycarpos Papadopoulos, Patras University)
- Elective 4 Course - Linking experiments with CFD (Dr Pavlos Zachos, Aristeia Philipou, Research assistant, Cranfield University)
- Horizontal topic – Advanced programming with open source software (OpenFOAM) (Prf Polycarpos Papadopoulos, Geroge Vafakos, Research Assistant, Patras University
- Horizontal topic – how to deal with Navier-Stokes equations from a teaching point of view (Prof. Manel Soria, Polytechnic University of Catalonia).

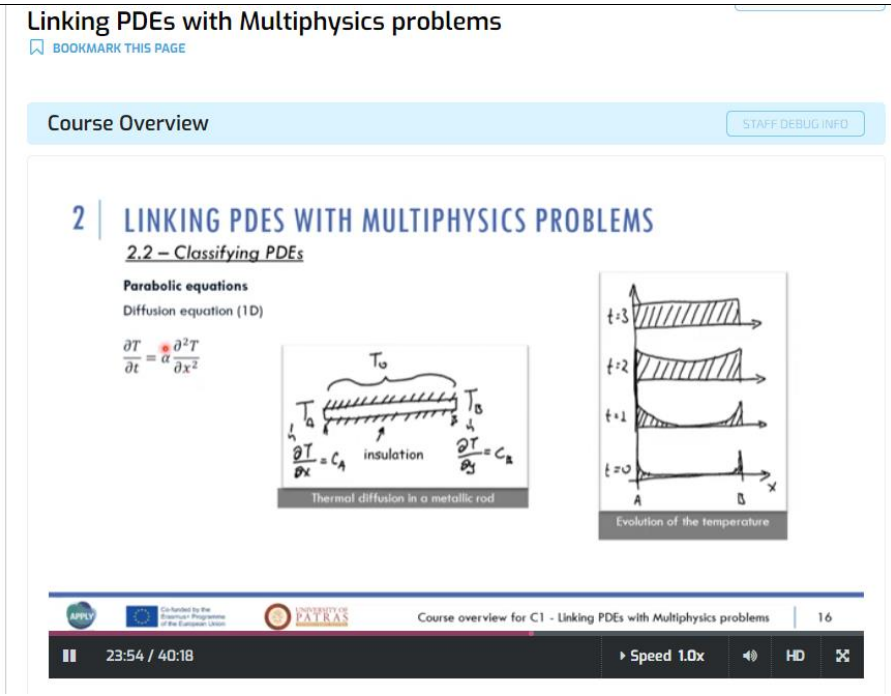

Figure 5 Example of video recording on Partial Differential Equations

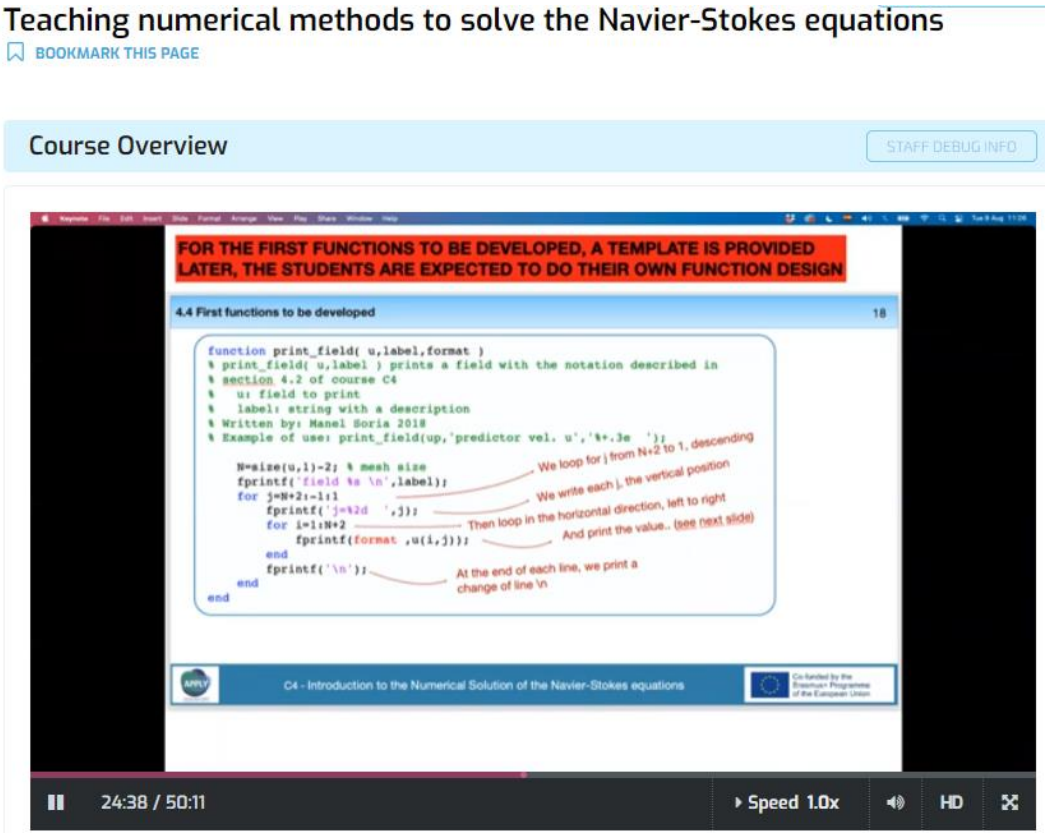

Figure 6 Example on Navier-Stokes Equation

3.2.Getting the word out

To get the word out, an About page was created following the project's visual identity. The Course description page acted as an advertisement of the APPLY course since it could be easily shared without the need of registration and reach all engaged instructors in the APPLY MSc from the three countries. The page included information related to:

- The course aims and objectives
- The course learning outcomes
- The structure and the main topics
- A short CV of the instructors and content developers

The picture below depicts the visual layout.

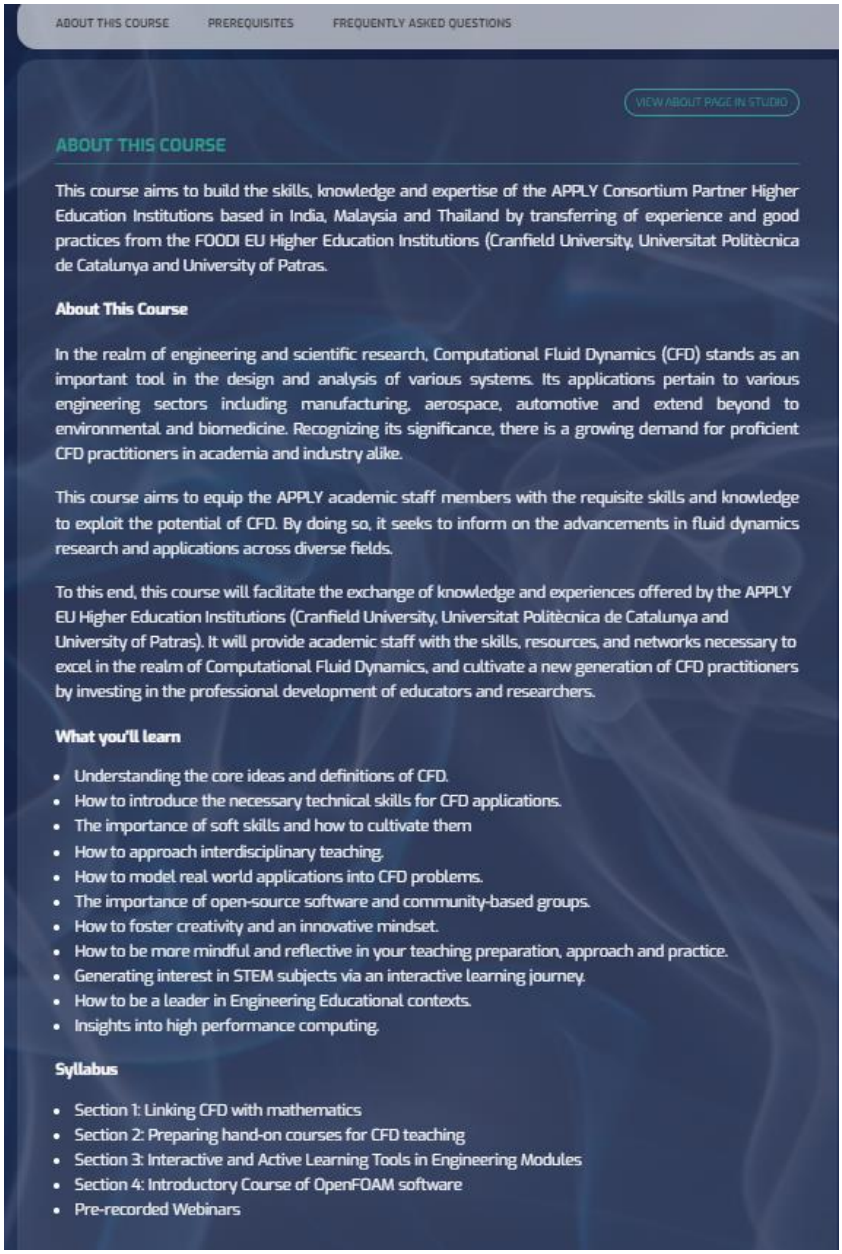

Figure 7 APPLY Staff training online course

Mobile learners

In general, the percentage of learners who access online courses through smartphones is constantly rising – one out of three accessed the course through mobile devices. Having this in mind the following best practices were employed:

- Implementation of a custom theme (branding, colors, fonts, buttons) to support registering, enrolling and performing learning activities. The theme must be responsive and able to display content in displays with different size.
- Keep display names of sections and labels concise.
- Avoid if possible, learning material in Flash since mobile platforms do not support it efficiently.
- When needed, components in HTML will use relative rather than explicit sizes for objects so that they scale appropriately when viewed on displays of different sizes.

Open access

The APPLY Staff training course is offered freely and openly for educators, for use, reuse, adaptation and sharing through the APPLY Online Training Platform. There will be constraints imposed regarding commercial reuse of the material as well as giving appropriate credit and license when reusing the material. Thus, the resources were released under the Creative Commons License - NonCommerical-ShareAlike 4.0).Participants are free to share, remix, transform and build upon the offered material. In the case of remixing, the updated material must be distributed under the same conditions to multiply the impact. All resources are available in downloadable and editable formats so that the user can store them locally and access them when offline (such as text documents, presentations and videos). The quality of these open educational resources will be assured based on OER commons recommendations, as well as the EU Open Education 2030 vision on lifelong learning.

3.3 Enrolments and Engagement

The platform acted as a central online space facilitating the training procedure. The APPLY MSc, published early in 2022 and is constantly populated with additional material after collaboration with project partners. In total, 59 Academic and Administrative Staff have accessed the online training material.

The figure below depicts the enrolments per partner country.

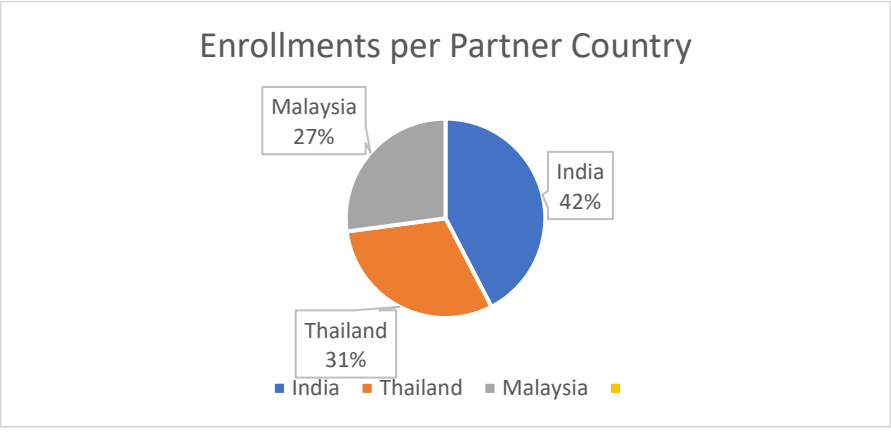

Figure 8 Share of enrolments per Partner Country

Evaluation

At the end of the course the participants were asked to optionally evaluate the course through an evaluation questionnaire (Appendix 1). The first section focused on measuring the level of satisfaction in different elements of the online training experience. The following questions were included (Likert scale from 1 to 5).

- Q1: The course delivered the information I expected to receive
- Q2: The contents of the topics were presented effectively
- Q3: The instructors were available when needed
- Q4: As a result of this online course, I gained new knowledge applicable to my work
- Q5: I plan to apply what I learned in this course
- Q6: Which type of material is the most useful (possible answers: Training notes in the form of: a)slides, b:handbook, c:video lecture)
- Q7: The APPLY platform was easy to use
- Q8: Did you have any difficulties in participating in the course?

In general, the responders provided positive feedback (votes were between 4 "Agree" and 5 "Strongly Agree"). The two statements that received the most positive feedback were: "The APPLY platform was easy to use" and "I plan to apply what I learned in this course", highlighting the focused and fit-in-need topics presented. It is more fair to claim that participants were upskilled rather than gained new knowledge since they are experts in their topics. The main outtake is that they experienced alternative ways of teaching complicated and hands-on topics. This is also backed up by the answers to the question "What type of training note material is more useful?" where the responders preferred slides or handbooks, which are in downloadable formats and can be used to update or adjust their teaching notes easily. The recorded lectures acted as accompanying material that trainees could revisit for further clarification or elaboration.

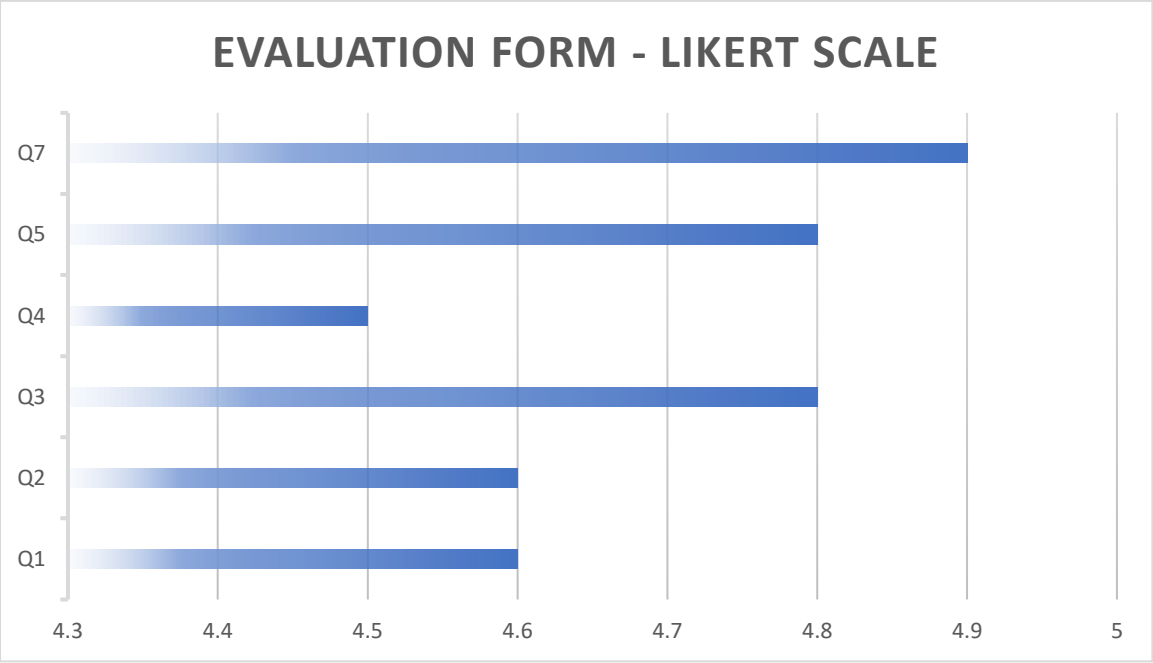

Figure 9 Evaluation survey responses

4. Conclusions

Through the APPLY platform, trainees had the possibility to access training material that was developed and offered during different phases of the project. The APPLY ACADEMIC STAFF TRAINING online course was designed and developed aggregating different types of training material that could facilitate the instructor in delivering the highly specialised APPLY MSc programme. The following best practices and features were adopted:

1. Easy access and sharing: The course is available to instructors upon registration, and the material can be downloaded. The course also has a unique link to facilitate sharing among interested parties. Participants can share their experience through social media links (FB, X, or direct mail) on the course description page.
2. Set important course dates: It is essential to set the course and enrollment start and end dates once, as constant updates on these dates can discourage participants. Additionally, pre-recorded sessions are integrated into the course as additional material to facilitate knowledge transfer for participants who cannot attend live sessions.
3. Build diverse learning sequences: Empirical studies and research show that a diverse content experience drives learner engagement.
4. Manage unit depth: Each course unit contains a limited number of components to promote learner engagement. Therefore, up to two components per unit were used in the APPLY course.
5. Assign staff and admin roles for technical support: Create a technical support procedure for troubleshooting

Abbreviations

Acronym	Definition
VLE	Virtual Learning Environments
ECTS	European Credit Transfer and Accumulation System
WCAG	Web Content Accessibility Guidelines
CFD	Computational Fluid Dynamics
PDE	Partial Differential Equation
STEM	Science, technology, engineering, and mathematics

ANNEX 1 - Evaluation Questionnaire

APPLY - Academic Staff training

Project no: 609965-EPP-1-2019-1-TH-EPPKA2-CBHE-JP

01. The course delivered the information I expected to receive. *

1	2	3	4	5
○	○	○	○	○

02. The contents of the topics were presented effectively. *

1	2	3	4	5
○	○	○	○	○

03. The instructors were available when needed. *

1	2	3	4	5
○	○	○	○	○

04.As a result of this online course, I gained new knowledge applicable to my work. *

1	2	3	4	5
○	○	○	○	○

05. I plan to apply what I learned in this course. *

1	2	3	4	5
○	○	○	○	○

06. Which type of the material is the most useful? *

1. Traning notes in the form of slides
2. Traning notes in the form of handbook
3. Training notes in the form video lecture

07. The APPLY online platform was easy to use *

1	2	3	4	5
○	○	○	○	○

08. Did you have any technical difficulties participating in the course (select all that apply) *

- [ ] Could not register/create account
- [ ] Problems enrolling in the course
- [ ] Problems with internet connection
- [ ] Luck of technical support
- [ ] Not at all

9. suggest ways to improve the APPLY online course

Long-answer text