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FERTILE Main Training Events Report

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ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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0.1	UniWA, URJC, CUB, CUP, UVa	Input data from training events in particular partner universities
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0.3	CUP, URJC, UVa	Adding and updating data
0.4	CUB: Zuzana Kubincová	Proofread and publication

CONTENTS

ACRONYMS

List of abbreviations

Async	Online Asynchronous modality
CP	Community Platform
CS/Inf	Computer Science / Informatics
CT	Computational Thinking
ER	Educational Robotics
F2F	Face-to-face modality
FDM	Fertile Design Methodology
DBR	Design Based Research
MSc	Masters of Science
UniWA	University of West Attica, Greece (project coordinator)
URJC	Universidad Rey Juan Carlos, Spain (project partner)
CUB	Comenius University Bratislava, Slovakia (project partner)
CUP	Univerzita Karlova, Czech Republic (project partner)
UVa	Universidad de Valladolid, Spain (project partner)
Osync	Online Synchronous modality
TE	Training Event

Executive Summary

In this report, the "FERTILE" consortium presents the organisation and evaluation of the Training Events that took place in all the countries of the organisations participating in the "FERTILE" project. These training events were one of the main results of the project. Their organisational schema and training materials used were tested in prior pilot studies and subsequently modified.

The report is organised into six sections. The first section, titled *Introduction,* presents how these training events accommodated the "FERTILE" project's objectives. The following section describes the training schema of the training events. In the 4th section, titled *Organisation of the "FERTILE" Training Events,* we elaborate on how each partner organised the training events in their organisations. In the *Evaluation of the "FERTILE" Training Events* section, we present descriptive data on the events' participants (both trainers and trainees), describe the data collection methods and analyse the data gathered. In the *Key Findings* section, we outline the similarities and differences of the data sets collected from the partners. The 5th section summarises the findings, and the last section concludes the report.

The appendix presents community analytics outputs extracted from the "FERTILE" community platform. Although they are not limited to the data collected during the "FERTILE" training events, they demonstrate the extent to which the platform has been utilised within the project's duration. They illustrate the extent to which European teachers designed Artful ER projects based on the "FERTILE" design methodology in the "FERTILE" community platform.

We anticipate that those teachers who practised the "FERTILE" training in pilot studies or the main training events will be multipliers of the "FERTILE" initiative to the educational community.

1. INTRODUCTION

The “FERTILE” consortium organised pilot studies and training events in the context of the “FERTILE” project Result #4 (R4): the “FERTILE” Training. As proposed in the application and included in the Grant Agreement, the Main training events for about 200 educators were to be implemented in the countries of the participating organisations. These training events (TEs) integrated Multiplier events (MEs) for the project into their initiations. We had proposed such an organisation in the application, intending to extend informing educators about the “FERTILE” initiative. Our rationale was to extend the Multiplier events’ impact on the educational community by training educators to integrate the “FERTILE” initiative into their practice.

Following an experiential model, the training events were organised in a blended learning context, thus aligning with and promoting the “FERTILE” design methodology approach. We have structured the training events to last 20 hours, blending 9 hours of face-to-face (F2F) with 6 hours of online synchronous (OSyn) and 5 hours of asynchronous (Asyn) sessions. Notably, during the actual training events implemented, this training schema was successfully adapted to the particular partners’ context. The period planned for training events was from February 2024 to January 2025.

2. TRAINING SCHEMA OF THE "FERTILE" TRAINING

We have piloted the organisation and implementation of the "FERTILE" training during pilot studies in the countries of the partner organisations. The data collected and analysed in the pilot studies are presented in the "Evaluation report of the "FERTILE" training in the pilot studies". We designed a training schema based on this report's conclusions and the discussion during the 5th Transnational Project Meeting held in Bratislava in May 2024.

Table 3.1 includes the training schema of a "FERTILE" Training event. It determines a sequence of topics, their modality and time allocation, a sequence of activities per topic and the learning materials used. The subsequent Table 3.2 complements Table 3.1, including the "FERTILE" training material utilised. Notably, the partners adjusted this training schema while implementing training events in their organisations. Indeed, the several variations implemented by the "FERTILE" consortium, which we present in the 3rd section of this report, reveal that trainers may adapt the learning modalities and/or activities of the "FERTILE" training to fit any particular trainees' needs.

Table 3.1 Training schema of a "FERTILE" Training event

Topics	Modality / Time	Activities	Training material	Objective
Conceptualisation of the "FERTILE" Design Methodology	F2F 4h	Overview of the "FERTILE" initiative addressed by the "FERTILE" project	1.1	Conceptualisation of the interdisciplinarity combining ER and Arts
		Workshop on Arts education combined with Educational Robotics	2.1 2.2	
		Presentation of Learning Design ideas for Educational Robotics in a blended learning context (Project categories)	2.3	
		Workshop on Computational Thinking (CT) Skills	1.6	Familiarisation with CT Skills
Introduction to the "FERTILE" Design Methodology	F2F 1h	Introduction to the "FERTILE" Design Methodology for designing Artful ER projects, i.e., interdisciplinary projects combining ER with Arts to promote CT skills	4.1	Comprehension of how to design an Artful ER project based on the FDM
		Overview of an Artful ER Project (exemplar)	4.4	
		Artful ER project analysis (Worksheet)	4.5	
Initiation of Interdisciplinary collaboration	F2F 1h	Workshop on signing in the "FERTILE" community platform and practising its community functionalities (partner identification at the list of community members and communication through forum and messages)	3.3	Familiarisation with the "FERTILE" community (CP) platform
	Async 4h	Introduction to CT skills and their integration in an Artful ER project	1.4 1.5	Interdisciplinary project idea formulation
		Introduction to ER technologies and simulators and indicative applications related to Arts	1.2 1.3 3.2	
		Collaboration between ER and Art educators to generate an interdisciplinary project idea.	2.5	

Table 3.1 Training schema of a "FERTILE" Training event (continued)

Topics	Modality / Time	Activities	Training material	Objective
Scaffolding of using the "FERTILE" Design Methodology for blended learning	OSync 3h	Q&A regarding the previous asynchronous activity Webinar on designing based on the "FERTILE" Design Methodology (FDM) for blending learning Presentation of a particular Simulator	4.2	Conceptualisation of using the FDM to design Blended Learning
	Async 4h	Collaboration between ER and Art educators for Interdisciplinary Project idea culmination	4.3	Interdisciplinary project idea culmination
Culmination of Interdisciplinary Collaboration		Collaboration between ER and Art educators to co-design an Artful ER project based on the "FERTILE" Design Methodology (FDM) in the "FERTILE" community platform (CP).	3.4	Empirical practice of utilising the FDM to co-design in the "FERTILE" community platform
Artful ER project presentation & evaluation	OSyn 3h	Teams of ER and Art educators present their Artful ER projects Reflect through peer review- Artful ER project evaluation (Rubric)	4.6	Reflection on co-designing Artful ER project to promote CT skills

Table 3.2 includes the corresponding “FERTILE” training materials, which are available as Open Educational Resources on the project website: https://fertile-project.eu/trainingmaterial/ and may be used in various modalities - face-to-face, online synchronously or asynchronously.

Table 3.2: The “FERTILE” training material

1. Robotics as an educational tool for cultivating CT
1.1 Overview of the "FERTILE" initiative of integrating artful ER projects into the educational practice (presentation) 1.2 Teaching ER or with ER at various educational levels (presentation, documents) 1.3 ER technologies and indicative applications(videos) 1.4 Introduction to Computational Thinking (presentation, tasks) 1.5 CT skills involved in the FERTILE methodology (video) 1.6 Workshop on CT skills (presentation, worksheets, quiz)
2. Interweaving ER with Arts
2.1 Art Education combined with ER (collaborative activity - workshop) 2.2 Examples of combining several Art forms with Educational Robotics (video) 2.3 Examples of interdisciplinary projects combining Art and ER (interactive presentation) 2.4 Interdisciplinary projects analysis (discussion) 2.5 Interdisciplinary project idea generation. (worksheet)
3. Blending F2F with online experience through exemplary artful ER projects.
3.1 Learning Design ideas for Educational Robotics in a blended learning context (presentation) 3.2 ER simulators and indicative applications (videos) 3.3 Introduction to the “FERTILE” Community Platform (video) 3.4 Practice the main functionalities of the “FERTILE” Community Platform (worksheet, user guide)
4. The FERTILE design methodology and the "FERTILE" Community platform.
4.1 Introducing FERTILE Design Methodology (video) 4.2 Familiarisation with the "FERTILE" design methodology (webinar) 4.3 Interdisciplinary project idea culmination. (worksheet) 4.4 Exemplar Artful ER projects based on the FERTILE Design Methodology (videos) 4.5 Artful ER project analysis (worksheet) 4.6 Artful ER project evaluation (rubric document)

3. ORGANISATION OF THE "FERTILE" TRAINING EVENTS

Although the training schema for the "FERTILE" Training was common, the implementation by different universities in different countries, even with different educational systems, required specific changes. The resulting implementation was, therefore, different, and this chapter looks at when and under what conditions the individual TEs took place.

In what follows, we describe the training events organised per partner organisation.

3.1 CUB

The number of participants for the FERTILE Multiplier and Training events organised by CUB was 41. In our conditions, we needed to divide this number into two groups, so we realised two editions of TEs. The non-profit organisation "We Teach with Hardware" (https://ucimeshardverom.sk), which has contact with a wide community of in-service teachers interested in educational robotics, supported the promotion, registration, administration of the LMS, and part of the communication. Thanks to this collaboration, we attracted the required number of participants. The "FERTILE" research team members from Comenius University undertook the training tutoring.

3.1.1 CUB First Edition

Training event schedule: April 2024 – June 2024

PHASE 1. April 19, 2024 (Friday) 15:00 - 18:10,
F2F session at the Faculty of Mathematics, Physics and Informatics in Bratislava

Objectives of the first Phase:

- Facilitate the introduction of trainees and trainers.
- Highlight the interdisciplinary approach combining Educational Robotics and Art.
- Provide an introduction to Computational Thinking skills.

During the session, trainees:

- were introduced to the main activities of the FERTILE project [brief presentation],
- were familiar with the basics of educational robotics for different levels of education [presentation],
- participated in a workshop on Computational Thinking skills [workshop materials – presentation, video, worksheet].

PHASE 2. April 20, 2024 – May 3, 2024
Asynchronous activities

Objectives of the second phase:

- Explore ways in which educators may combine Educational Robotics with different forms of Art.

- Become familiar with Educational Robotics technologies that utilize physical materials and online robotics simulators.
- Develop an initial concept for their own project integrating Educational Robotics and Art. These projects were referred to as **Artful Educational Robotics projects**.

During Phase 2, trainees:

- explored interdisciplinary approaches and examined how Educational Robotics can be integrated with various forms of Art. A [video lecture] and an [interactive presentation] were available, presenting different categories of Artful Educational Robotics projects,
- were introduced to Educational Robotics technologies, including **(1) MakeBlock, (2) LEGO Spike, (3) Codey Rocky, (4) Arduino, (5) Beebot, and (6) Micro:bit**, by watching videos on their key functionalities available in the [YouTube playlist],
- learned about robotics simulators such as **(1) Unibotics, (2) EV3Makecode, (3) TerrapinLogo Beebot, (4) Tinkercad, and (5) Micro:bit Makecode**, through instructional videos available in the [YouTube playlist],
- engaged in discussions with their collaboration partners via the **Padlet** platform to share experiences about educational robotics, cross-curricular projects, etc.

PHASE 3. May 4, 2024 (Saturday) 08:30 - 11:40
F2F session at the Faculty of Mathematics, Physics and Informatics in Bratislava

Objectives of the third phase:

- Engaged in hands-on activities to explore the structure of an Artful Educational Robotics project [workshop].
- Develop an initial concept for their own Artful Educational Robotics project.

During Phase 3, trainees:

- worked in pairs (a computer science teacher and an art teacher) as they were co-enrolled. They chose one of the robotic kits/robots from the following options: **Makey-Makey, Lego Prime Spike, Ozobot Evo or Micro:bi**t. For all the robots educational materials were prepared. They had to modify them according to the FERTILE design methodology and present their projects at the end of the phase.

PHASE 4. May 5 – 17, 2024
asynchronous activities

Objectives of the fourth phase:

- Explore the **FERTILE design methodology**, which they would apply in developing their projects [methodology presentation].
- Register on the FERTILE community platform [worksheet].
- Familiarize with the FERTILE Community Platform.

During Phase 4, trainees:

- explored the **functionalities of the FERTILE Community Platform** that support participation in an educational community and collaborative project design. This was facilitated through the [User Guide].

Phase 5. May 18, 2024 (Saturday) 08:30 - 11:40
F2F session at the Faculty of Mathematics, Physics and Informatics in Bratislava

Objectives of the fifth phase:

- Co-design an Artful Educational Robotics project on the platform, following the FERTILE design methodology.
- Present and evaluate the Artful Educational Robotics projects developed by the trainee teams.
- Familiarize trainees with the FERTILE design methodology.

During Phase 5, trainees:

- went through the questions and discussed uncertainties raised during the self-study of the platform and methodology,
- worked on their Artful Educational Robotics projects in teams. Each project included a brief description, the challenges encountered, and the solutions adopted by the team.

Phase 6. May 19, 2024 – June 10, 2024
asynchronous activities

Objectives of the sixth phase:

- Analyze exemplary Artful Educational Robotics projects, focusing on the steps and dimensions of the adopted methodology.
- Work collaboratively with their partners to finish designing the Artful Educational Robotics project on the FERTILE Community Platform.

During Phase 6, trainees:

- **analyzed exemplary Artful Educational Robotics projects** available on the FERTILE Community platform, examining their structure with a focus on:
    - the steps of the FERTILE methodology and its interdisciplinary approach,
    - the development of Computational Thinking skills,
    - the blended implementation framework. [worksheet]

Phase 7. June 14, 2024 (Friday) 15:00 - 17:00 and June 15, 2024 (Saturday) 09:00-10:00
Online synchronous session (Zoom)

During Phase 7, trainees:

- **presented** their Artful ER project proposals,
- **evaluated** each other's projects using the prepared rubrics [document].

3.1.2 CUB Second Edition

Training event schedule: October 2024 – November 2024

PHASE 1. October 12, 2024 (Saturday) 9:00 - 16:30,
F2F session at the Faculty of Mathematics, Physics and Informatics in Bratislava

Objectives of the first Phase:

- Facilitate the introduction of trainees and trainers.
- Highlight the interdisciplinary approach combining Educational Robotics and Art.
- Provide an introduction to Computational Thinking skills.
- Engage in hands-on activities to explore the structure of a project integrating Educational Robotics and Art [workshop].
- Develop an **initial concept** for their own **Artful Educational Robotics project**.

During the session, trainees:

- were introduced to the main activities of the FERTILE project [brief presentation],
- were familiar with the basics of educational robotics for different levels of education [presentation],
- participated in a **workshop on Computational Thinking skills** [workshop materials – presentation, video, worksheet],
- worked in pairs (a computer science teacher and an art teacher) as they were co-enrolled. They chose one of the robotic kits/robots from the following options: **Makey-Makey, Lego Prime Spike, Ozobot Evo, or Micro:bit**. For all the robots educational materials were prepared. They had to modify them according to the FERTILE design methodology and present their projects at the end of the phase.

PHASE 2. October 12 – 25, 2024
Asynchronous activities

Objectives of the second phase:

- Explore ways in which Educational Robotics can be combined with different Art forms.
- Become familiar with Educational Robotics technologies that utilize physical materials as well as online robotics simulators.
- Develop an initial concept for their own Artful Educational Robotics project.
- Explore the FERTILE design methodology, which they would apply in developing their own projects [methodology presentation].
- Registered on the FERTILE community platform [worksheet].
- Familiarise trainees with the FERTILE design methodology.
- Familiarise trainees with the FERTILE Community Platform.

During Phase 2, the trainees:

- explored interdisciplinary approaches and examined how Educational Robotics can be integrated with various Art forms. A [video lecture] and an [interactive presentation] were available, presenting **different categories of Artful Educational Robotics projects**.
- were introduced to Educational Robotics technologies, including **(1) MakeBlock, (2) LEGO Spike, (3) Codey Rocky, (4) Arduino, (5) Beebot, and (6) Micro:bit**, by watching videos on their key functionalities available in the [YouTube playlist],
- learned about robotics simulators such as **(1) Unibotics, (2) EV3Makecode, (3) TerrapinLogo Beebot, (4) Tinkercad, and (5) Micro:bit Makecode**, through instructional videos available in the [YouTube playlist],
- engaged in discussions with their collaboration partners via the Padlet platform to share experiences about educational robotics, cross-curricular projects, etc.,
- explored the f**unctionalities of the FERTILE Community Platform** that support participation in an educational community and collaborative project design. This was facilitated through the [User Guide].

PHASE 3. October 26, 2024 (Saturday) 10:00 - 12:30
Online synchronous session (Zoom)

Objectives of the third phase:

- Presentation of the FERTILE design methodology via webinar.
- Introduction to Educational Robotics simulators.
- Co-design an Artful Educational Robotics project on the platform, following the FERTILE design methodology.

During Phase 3, the trainees:

- participated in a webinar to explore the **FERTILE design methodology**, which they would apply in developing their projects [methodology presentation]. This session provided an opportunity to discuss the implementation of the methodology in the design of Artful Educational Robotics projects.
- were introduced to different simulators and worked individually in a specific **simulator** (**Open Roberta**) according to the assignment,
- worked on their Artful Educational Robotics projects in teams. Each project included a brief description, the challenges encountered, and the solutions adopted by the team.

PHASE 4. October 27, 2024 – November 15, 2024
asynchronous activities

Objectives of the fourth phase:

- Analysis of exemplary Artful Educational Robotics projects, focusing on the steps and dimensions of the adopted methodology.
- Working collaboratively with their partners to finish designing an Artful Educational Robotics project on the FERTILE Community Platform.

During Phase 4, trainees:

- **analyzed exemplary Artful Educational Robotics projects** available on the FERTILE Community platform, examining their structure with a focus on:
    - the steps of the FERTILE methodology and its interdisciplinary approach,
    - the development of Computational Thinking skills,
    - the blended implementation framework [worksheet].

Phase 5. November 16, 2024 (Saturday) 9:00 - 12:30
Online synchronous session (Zoom)

During Phase 5, trainees:

- **presented** their Artful ER project proposals,
- **evaluated** each other's projects using the prepared rubrics [document].

Training materials

The training materials utilised were
- custom LMS of the non-profit institution that helped to organize training events in CUB
- the "FERTILE" training materials available at the project website https://fertile-project.eu/trainingmaterial/
- the "FERTILE" community platform https://fertile.gsic.uva.es/

3.2 CUP

The number of participants in the FERTILE Multiplier and Training events organized by CUP was 40 from the central region of the Czech Republic. The training was implemented in the laboratories of Charles University in several synchronous and asynchronous meetings in the autumn of 2024. Due to organizational issues, we implemented the training in more editions. The first and second editions were organized in the same way and had 5 phases.

3.2.1 The first and second editions

Training event schedule: September 2024 - December 2024

Phase 1 (f2f)

- September 19, 15:30–18:30 and October 9, 14:30–17:30

Objectives of the phase:
- Facilitate the introduction of trainees and trainers.
- Introduce Computational Thinking (CT) skills and focus on CT in Art.
- Provide introduction to the interdisciplinarity of Educational Robotics and Art.
- Provide introduction to the FERTILE Design Methodology (FDM) and Platform (CP)

During the phase, trainees:
- were introduced to the ER technology and CT [presentations],
- participated in the **workshop on CT** [workshop materials],
- were introduced to the possibilities of **combining ER and ART** [interactive presentation]
- were introduced to the **FERTILE community platform** [brief presentation].

Phase 2 (asynchronous)

Objectives of this phase:

- Provide more information about ER technology.
- Provide more information about CT in the context of FDM.
- Introduce participants to FDM and familiarize them with the FERTILE community platform.

During this phase trainees:

- were introduced to the specific ER technology [videos],
- were introduced to the steps of **FDM** and their relation to the CT skills [video],
- practised with the "FERTILE" community platform [worksheets and video]

Phase 3 (f2f)

- September 26, 15:30–18:30 and October 16, 14:30–17:30

Objectives of this phase:

- Analyze Artful Educational Robotics project and understand the concept of FDM.
- Develop an initial concept for their own Artful Educational Robotics project.

During this phase, trainees:

- participated in **workshop** focused on simple activities with selected **ER technology (Lego Spike and Edison robots)**,
- were introduced to the concept of FDM in the **blended-learning context a**nd were introduced to the simulators for various ER technologies,
- analyzed existing exemplar projects with focusing on combination of ER and ART and blended-learning context [videos and worksheets],
- designed in pairs an idea of learning activity combining ART and ER as an initial version of their Artful ER project [workshop with worksheets],

Phase 4 (asynchronous)

Objectives of this phase:

- Develop the complete Artful ER project through the FERTILE community platform.
- Provide more information about simulators.

During the phase, trainees:

- worked in pairs or small groups on their own projects and completed them on the FERTILE community platform with an emphasis on identifying specific CT skills, implementing blended-learning context and following the ER and ART educational aims.

Phase 5 (online)

- October 10, 16:30–18:30 and November 13, 16:00–18:00

Objectives of the phase:

- Provide feedback to the developed Artful ER project.
- Provide a deeper understanding of FDM.

During this phase, trainees:

- **presented** their projects and discussed the key steps
- were introduced to the concept of FDM in the **blended-learning context a**nd were introduced to the simulators for various ER technologies,

- **analyzed** their own and other projects from the perspective of key aspects of FDM [presentation, discussion, worksheets]

3.2.2 The third edition

In the third edition, we organized the shorter modified ME for the advanced teachers, which had one f2f session on December 17. The teachers were from one specific associated school and were pre-trained based on the previous collaboration.

Objectives:

- Analyze Artful Educational Robotics project and understand the concept of FDM.
- Provide an introduction to the FERTILE Community Platform.

During this phase, trainees:

- analyzed existing exemplar projects by focusing on the combination of ER and ART and blended-learning context [videos and worksheets],
- were introduced to the concept of FDM in the **blended-learning context a**nd were introduced to the simulators for various ER technologies,
- were introduced to the steps of **FDM** and their relation to the CT skills [video]

Training materials

The training materials utilised were

- the Moodle training https://moodle.it.pedf.cuni.cz/training/view.php?id=2329
    - *to enter the Moodle training as a guest, use the key "FERTILE"*
- the "FERTILE" training materials available at the project website https://fertile-project.eu/trainingmaterial/
- the "FERTILE" community platform https://fertile.gsic.uva.es/

3.3 UniWA

The number of participants in the FERTILE training organized by UNIWA was 49 from various areas of Greece.

The research team of UniWA organised the Greek training event in five different phases, including face-to-face and online (synchronous and asynchronous) modalities. The trainees could access the training material through the "FERTILE" website. In particular, the link https://fertile-project.eu/training_guide_gr/ titled "Guide for the Greek Training Event" was created and sent to the trainees before the first face-to-face meeting. As shown in the "Training Event Schedule", this guide informed the trainees about each phase, including its timetable, pedagogical objectives, training materials, and assignments.

Training event schedule: November 2024 - December 2024

PHASE 1. November 9, 2024 (Saturday) 09:00 - 15:00,
F2F session at the UniWA Aigaleo Campus

Objectives of the first Phase:

- Facilitate the introduction of trainees and trainers.
- Highlight the interdisciplinary approach combining Educational Robotics and Art.
- Provide an introduction to Computational Thinking skills.

By the end of the session, each trainee was expected to have identified a partner with whom to collaborate.

During the session, trainees:

- were introduced to the main activities of the FERTILE project [brief presentation],
- engaged in hands-on activities to explore the structure of a project integrating Educational Robotics and Art. These projects were referred to as **Artful Educational Robotics projects** [workshop],
- participated in a workshop on Computational Thinking skills [workshop materials],
- registered on the FERTILE community platform [worksheet],
- received guidelines regarding the asynchronous activities of Phase 2.

Additional resources provided:

- [Full presentation] of the FERTILE project.
- [Video lecture], [Presentation], [Poster] on Computational Thinking.
- [Video] tutorial on the FERTILE community platform.

PHASE 2. November 10, 2024 - November 20, 2024
Online asynchronous activities

Objectives of the second phase:

- Explore ways in which Educational Robotics can be combined with different Art formst.
- Become familiar with Educational Robotics technologies that utilise physical materials as well as online robotics simulators.
- Develop an initial concept for their own Artful Educational Robotics project.

During Phase 2, trainees:

- explored interdisciplinary approaches and examined how Educational Robotics can be integrated with various forms of Art. A [video lecture] and an [interactive presentation] were available, presenting different categories of Artful Educational Robotics projects.

- were introduced to Educational Robotics technologies, including **(1) MakeBlock, (2) LEGO Spike, (3) Codey Rocky, (4) Arduino, (5) Beebot, and (6) Micro:bit**, by watching videos on their key functionalities available in the [YouTube playlist],
- learned about robotics simulators such as **(1) Unibotics, (2) EV3Makecode, (3) TerrapinLogo Beebot, (4) Tinkercad, and (5) Micro:bit Makecode**, through instructional videos available in the [YouTube playlist],
- engaged in discussions with their collaboration partners to determine the theme and learning objectives of their Artful Educational Robotics project, which they would design during the training program. They had the option to use **Messages or the Forum** on the FERTILE

community platform, as well as any other preferred communication method. The **worksheet** was suggested as a discussion guide (though not required to be completed) to facilitate the co-design process.

PHASE 3. November 23, 2024 (Saturday) 15:00 - 18:00
Online synchronous session (Microsoft Teams)

Objectives of the third phase:

- Familiarize trainees with the FERTILE design methodology.
- Introduce them to an Educational Robotics simulator.
- Analyze exemplary Artful Educational Robotics projects, focusing on the steps and dimensions of the adopted methodology.

During Phase 3, trainees:

- participated in a **webinar** to explore the FERTILE design methodology, which they would apply in developing their own projects [methodology presentation]. This session provided an opportunity to discuss the implementation of the methodology in the design of Artful Educational Robotics projects *(Duration: 30'-45').*
- took part in a **workshop on Educational Robotics simulators**, where they used **Open Roberta** [presentation] to test and refine their ideas before incorporating them into their projects *(Duration: 30'-45').*
- analyzed **exemplary Artful Educational Robotics projects** available on the **FERTILE Community platform**, examining their structure with a focus on:
    1. the steps of the FERTILE methodology and its interdisciplinary approach,
    2. the development of Computational Thinking skills,
    3. the blended implementation framework. [worksheet],
- received an **overview of the asynchronous activities of Phase 4**. [presentation]

Additional resources provided:

- [Video presentation] and [Poster] on the FERTILE learning design methodology.
- [YouTube playlist] and [Exemplary Artful Educational Robotics projects] available on the **FERTILE** platform.

PHASE 4. November 24,2024 - December 6, 2024
Online asynchronous activities (FERTILE Community Platform)

Objectives of the fourth phase:

- Familiarize trainees with the **FERTILE Community Platform**.
- Co-design an **Artful Educational Robotics project** on the platform, following the **FERTILE design methodology**.

During Phase 4, trainees:

- explored the functionalities of the **FERTILE Community Platform** that support participation in an educational community and collaborative project design. This was facilitated through the [User Guide].
- worked collaboratively with their partners to **design an Artful Educational Robotics project** on the **FERTILE Community Platform**. To support this process, they utilized the **FERTILE Design Methodology Guide**, available in both digital and printed formats.

By the end of Phase 4, each team was expected to have completed an Artful Educational Robotics project on the FERTILE Community Platform.

Phase 5. December 7, 2024 (Saturday) 15:00 - 18:00
Online synchronous session (Microsoft Teams)

Objectives of the fifth phase:

- Present and evaluate the **Artful Educational Robotics projects** developed by the trainee teams.
- Reflect on the overall training experience.

During Phase 5, trainees:

- **presented** their **Artful Educational Robotics projects** in teams. Each presentation included a brief description of the project, the challenges encountered, and the solutions adopted by the team *(Project overview link – 18 projects)*,
- **participated in a peer evaluation activity**, providing feedback on the presented projects using **Padlet**,
- **reflected on their training experience** by completing an **evaluation questionnaire**,
- **discussed** the potential **implementation of their projects with students** in real educational settings, utilizing the platform. Additionally, they shared their vision for the **future of the FERTILE Community** through an interactive activity in **Mentimeter**.

Training materials

The training materials utilised were

- the Training Guide https://fertile-project.eu/training_guide_gr/
- the "FERTILE" training materials available at the project website https://fertile-project.eu/trainingmaterial/
- the "FERTILE" community platform https://fertile.gsic.uva.es/

3.4 URJC

The Multiplier and Training events, organized by URJC in collaboration with the Consejería de Educación, Ciencia y Universidades of Madrid (CECUM), had 111 participants completing the full training. For our purposes, we needed to divide participants into two groups, resulting in two separate sessions with 60 participants at most. The promotion, registration, management of the online training system, and communication were handled by URJC. The partnership with the CECUM enabled us to secure the required number of participants. Tutoring for the training was carried out entirely by

members of the FERTILE team from Universidad Rey Juan Carlos. The Multiplier Event was held on January 8th from 10:00 to 13:00, while the Training Event complementing the multiplier event took place from January 8th at 15:00 to January 25th.

The Spanish training event was conducted in three phases, both face-to-face and online (synchronous and asynchronous), from January 8 to January 20, 2024.

Training event schedule: January 2025

training Schedule

- January 8, 2025 (Friday) 14:00 - 17:00
  F2F session at the School of Engineering of Fuenlabrada
- January 10, 2025 (Friday) 17:00 – 18:00
  Online synchronous session.
- January 9 – January 25, 2025
  Distance self-study (asynchronous)

PHASE 1: January 8, 2025 (Wednesday) 14:00 - 17:00, F2F session in Madrid

Objectives:

- Introduce trainees and trainers
- Highlight the interdisciplinary approach combining Educational Robotics and Technology
- Provide an introduction to Computational Thinking skills
- Engage participants in hands-on activities and workshops
- Guide participants through registration on the FERTILE community platform
- Develop an initial concept for an Educational Robotics project
- Foster discussions with collaboration partners

Activities: During this phase, participants were introduced to the FERTILE project through an overview presentation. They engaged in hands-on activities that explored the integration of robotics and technology in education. Workshops were conducted to introduce Computational Thinking concepts, allowing participants to work in groups to solve problem-based challenges. Additionally, they registered on the FERTILE community platform and started discussing potential collaboration ideas with their peers.

PHASE 2: January 10 (Friday) 17:00-18:00, 2025 - Online synchronous activities

Objectives:

- Explore interdisciplinary approaches combining Educational Robotics with various subjects
- Introduce different Educational Robotics technologies and simulators
- Provide an overview of blended learning methodologies in robotics
- Guide participants on how to integrate digital and face-to-face teaching strategies

Activities: During this online session, participants attended a live webinar where they were introduced to various Educational Robotics +technologies and simulators. Experts demonstrated their functionalities, and participants had the opportunity to ask questions and discuss potential

applications in their own teaching environments. The session also covered blended learning strategies and how they can be effectively applied to robotics education.

PHASE 3: January 9-25 2025 Online asynchronous session

Objectives:

- Explore functionalities of the FERTILE Community Platform
- Apply the FERTILE design methodology in a co-design process
- Collaborate with partners to create an Educational Robotics project
- Complete and refine projects using the FERTILE Design Methodology Guide
- Reflect on the training experience and prepare for implementation in schools

Activities: During this phase, participants worked independently and collaboratively on the FERTILE community platform. They explored available resources and guides, engaged in discussions with their partners, and co-designed an Educational Robotics project following the FERTILE methodology. Participants iteratively refined their projects based on feedback and finalized their designs for future implementation in schools. By the end of the phase, they submitted their completed projects and reflected on their learning experience through self-assessments and peer evaluations.

Training materials

The training materials utilised were

- the Training Guide https://roboticslaburjc.github.io/estudio-piloto-fertile/
- the "FERTILE" training materials available at the project website https://fertile-project.eu/trainingmaterial/
- the "FERTILE" community platform https://fertile.gsic.uva.es/

3.5 UVa

The Multiplier and Training Events, organized by UVA and assisted by URJC, were carried out in two editions. The first edition was implemented in a blended format in November and December 2024, while the second was fully online in January 2025. Note that the consortium got a special approval by the project officer of the responsible Greek Erasmus funding agency regarding the second edition of the events, given that only one face-to-face multiplier event was originally included in the project proposal. The following subsections describe the two editions of the Multiplier and Training events:

3.5.1 UVa First edition

The Multiplier and Training events, organized by URJC, UVA, and the CFIE of Valladolid, had a total of 11 participants completing the training. The promotion, registration, management of the online training system, and communication were handled by UVA and URJC. The collaboration with UVA and CFIE of Valladolid was instrumental in securing the required participants. Tutoring for the training was conducted entirely by members of the FERTILE team from Universidad Rey Juan Carlos, while the FERTILE team from Universidad de Valladolid participated in the training; provided assistance to the participants especially regarding the Community Platform developed by the UVa team; and supported the tutoring URJC team. The Multiplier Event was held on November 26 from 16:30 to 19:00 while the

Training Event took place from November 28th at 16:30 to December 20th. The participants had full access to the study guide and the associated materials.

Training event schedule: November - December 2024

- November 26, 2024 (Tuesday) 16:30 - 19:00
  First F2F session at CFIE of Valladolid.
- November 28, 2024 (Thursday) 16:30 - 19:00
  Second F2F session at CFIE of Valladolid.
- December 3, 2024 (Tuesday) 16:30 - 19:30
  Third F2F session at CFIE of Valladolid.
- November 26 – December 20, 2024
  Distance self-study (asynchronous)

PHASE 1: November 26, 2024 (Tuesday) 16:30 - 19:00, F2F session in Valladolid

Objectives:

- Introduce trainees and trainers
- Introduce the training, and describe the sessions and materials
- Provide an overview of the FERTILE project
- Define, understand and work with examples of Computational Thinking skills and show different approaches to develop them in the classroom.
- Highlight the interdisciplinary approach combining Educational Robotics and Technology.
- Illustrate how to combine robotics with different art modalities to develop Computational Thinking
- Engage participants in hands-on activities and workshops, through different types of robotics materials in projects with artistic components.
- Ideate and discuss Artful Educational Robotics projects in groups

Activities: During this phase, participants were introduced to the events and their materials, while an overview of the FERTILE project was provided through a presentation. They engaged in hands-on activities that explored the integration of robotics and technology in education. Workshops were conducted to introduce Computational Thinking concepts, allowing participants to work in groups to solve problem-based challenges. Additionally, they ideated and discussed potential collaboration projects with their peers.

PHASE 2: November 28, 2024 (Thursday) 16:30 - 19:00 - F2F session in Valladolid

Objectives:

- Introduce different Educational Robotics technologies and simulators
- Provide an overview of blended learning methodologies in robotics
- Guide participants on how to integrate digital and face-to-face teaching strategies

Activities: During this second f2f session, participants explored ideas and examples of projects that combine robotics and art through an interactive presentation. Trainees were able to get familiar with materials and Artful Robotics projects that employ technologies such as Microbit, Nehza, Makey-Makey, Arduino, Bee-Bot, Izobot or Mbot, so that they might use them in their projects. Moreover, participants

were introduced to blended learnin,g and more specifically to blended learning in robotics using simulators. A workshop was held so that participants could have hands-on experience with several robotic simulators, such as MakeCode by Microbit, TinkerCad for Arduino, and Kibotics. The tutors demonstrated their functionalities within the context of artful robotics projects, and participants had the opportunity to ask questions and discuss potential applications in their own teaching environments.

PHASE 3: December 3, 2024 (Tuesday) 16:30 - 19:30 - F2F session in Valladolid

Objectives:

- Introduce the FERTILE Design Methodology (FDM)
- Get familiar with the functionalities of the FERTILE Community Platform (FCP) that enables teachers to design an artful robotics project, following the FERTILE Design Methodology
- Have a hands-on experience with the FERTILE Community Platform guided by an exemplar artful robotics project and assess the project using a rubric.
- Follow up with the ideation of the collaborative projects to be developed using FDM and FCP

Activities: During this third f2f se,ssion participants got acquainted with the "FERTILE" Design Methodology (FDM) through a video presentation. Several working examples of artful robotics projects designed using FDM were shown and discussed. Following an asynchronous activity in which participants watched a presentation video regarding the "FERTILE" Community Platform (FCP), they had the chance to use the functionalities of the "FERTILE" Community Platform (FCP) through a structured worksheet in which a set of activities was proposed. At the same time, participants were able to assess a given artful robotics project that was developed using FDM and FCP. Finally, the participants followed up with the ideation of their own group project to be implemented in the upcoming asynchronous phase.

PHASE 4: November 26 – December 20, 2024. Asynchronous online activities

Objectives:

- Explore functionalities of the FERTILE Community Platform
- Apply the FERTILE design methodology in a co-design process
- Collaborate with partners to create an Educational Robotics project
- Complete and refine projects using the FERTILE Design Methodology Guide
- Reflect on the training experience and prepare for implementation in schools

Activities: During this phase, participants worked independently and collaboratively on the FERTILE community platform. They explored available resources and guides, engaged in discussions with their partners, and co-designed an Educational Robotics project following the FERTILE methodology. Participants iteratively refined their projects based on feedback and finalised their designs for future school implementation. By the end of the phase, they submitted their completed projects and reflected on their learning experience through self-assessments and peer evaluations.

3.5.2 UVa Second Edition

The Multiplier and Training events, organised by URJC, UVA, and the CFIE of Valladolid, had a total of 28 participants completing the training. As in the first edition, the promotion, registration,

management of the online training system, and communication were handled by UVA and URJC. The collaboration with UVA and CFIE of Valladolid was instrumental in securing the required participants, although dissemination of the online events was made mainly through mailing lists to the multiple educational communities. Tutoring for the training was conducted entirely by members of the "FERTILE" research team of Universidad Rey Juan Carlos, while the FERTILE team from Universidad de Valladolid participated in the training; and provided assistance to the participants, especially regarding the Community Platform developed by the UVa team; and supported the tutoring URJC team. The Multiplier Event was held on January 14th from 17:00 to 19:00, while the Training Event took place from January 15th at 18:00 to January 31st. The participants had full access to the study guide and the associated materials.

Training event schedule: January 2025

- January 14, 2025 (Tuesday) 17:00 - 19:00
  First online synchronous session
- January 15, 2025 (Wednesday) 18:00 - 19:00
  Second online synchronous session
- January 16, 2025 (Thursday) 18:00 - 19:00
  Third online synchronous session
- January 21, 2025 (Tuesday) 17:00 - 19:00
  Fourth online synchronous session
- January 14 – January 31, 2025
  Distance self-study (asynchronous)

PHASE 1: January 14, 2025 (Tuesday) 17:00 - 19:00, synchronous online session

Objectives:

- Introduce trainees and trainers
- Introduce the training, and describe the sessions and materials
- Provide an overview of the FERTILE project
- Define, understand and work with examples of Computational Thinking skills and show different approaches to develop them in the classroom.

Activities: During this phase, participants were introduced to the events and its materials, while an overview of the FERTILE project was provided through a presentation. They engaged in hands-on activities that explored the integration of robotics and technology in education. A workshop was conducted to introduce Computational Thinking concepts, allowing participants to work in groups to solve problem-based challenges.

PHASE 2: January 15, 2025 (Wednesday) 18:00 - 19:00. Synchronous online session

Objectives:

- Highlight the interdisciplinary approach combining Educational Robotics and Technology
- Illustrate how to combine robotics with different art modalities to develop Computational Thinking

- Ideate and discuss Artful Educational Robotics projects in groups

Activities: During this second online synchronous session, participants explored ideas and examples of projects that combine robotics and art through an interactive presentation. Participants were also also invited to ideate and discuss in groups interdisciplinary projects to be undertaken in their own educational practice.

PHASE 3: January 16, 2025 (Thursday) 18:00 - 19:00. Synchronous online session

Objectives:

- Provide an overview of blended learning methodologies in robotics
- Guide participants on how to integrate digital and face-to-face teaching strategies
- Introduce different Educational Robotics simulators
- Navigate through various examples of artful educational robotics projects that involve blended learning activities through the use of simulators

Activities: In this third synchronous online session, trainees were involved in a guided tour through multiple examples of artful educational robotics projects that employ robotics simulators. The activities especially emphasized the strategies to be followed in order to design meaningful activities to be carried out in blended environments. The participants had the opportunity to ask questions and discuss potential applications in their own teaching environments.

PHASE 4: January 21, 2025 (Tuesday) 17:00 - 19:00. Synchronous online session

Objectives:

- Introduce the FERTILE Design Methodology (FDM)
- Get familiar with the functionalities of the FERTILE Community Platform (FCP) that enables teachers to design an artful robotics project, following the FERTILE Design Methodology
- Have a hands-on experience with the FERTILE Community Platform guided by an exemplar artful robotics project and assess the project using a rubric
- Follow up with the ideation of the collaborative projects to be developed using FDM and FCP

Activities: During this fourth synchronous online session participants were exposed to the FERTILE Design Methodology (FDM) through a video presentation. Several working examples of artful robotics projects designed using FDM were shown and discussed. Following an asynchronous activity in which participants watched a presentation video regarding the FERTILE Community Platform (FCP), they had the chance to use the functionalities of the FERTILE Community Platform (FCP) through a structured worksheet in which a set of activities was proposed. At the same time, participants were able to assess a given artful robotics project that was developed using FDM and FCP. Finally, the participants followed up with the ideation of their own group project to be implemented in the upcoming asynchronous phase.

PHASE 5: January 14 – January 31, 2025. Asynchronous online activities

Objectives:

- Explore functionalities of the FERTILE Community Platform
- Apply the FERTILE design methodology in a co-design process

- Collaborate with partners to create an Educational Robotics project
- Complete and refine projects using the FERTILE Design Methodology Guide
- Reflect on the training experience and prepare for implementation in schools

Activities: During this phase, participants worked independently and collaboratively on the FERTILE community platform. They explored available resources and guides, engaged in discussions with their partners, and co-designed an Educational Robotics project following the FERTILE methodology. Participants iteratively refined their projects based on feedback and finalized their designs for future implementation in schools. By the end of the phase, they submitted their completed projects and reflected on their learning experience through self-assessments and peer evaluations.

The training materials utilised were

- the Training Guide https://roboticslaburjc.github.io/estudio-piloto-fertile/
- the "FERTILE" training materials available at the project website https://fertile-project.eu/trainingmaterial/
- the "FERTILE" community platform https://fertile.gsic.uva.es/

4. EVALUATION OF THE FERTILE TRAINING EVENTS

In this section, we present and discuss the evaluation of the training events separately for each partner institution and collectively for the whole project. We provide the participants' demographics in each training event, describe the methods for collecting the data needed to evaluate these events, and then present the results of the data analysis and provide an interpretation of the data.

4.1 Participants

For the purposes of this report, we consider participants in FERTILE Training events to be both trainees and trainers. In what follows, we present descriptive data about these groups for each partner organisation.

4.1.1 CUB

Trainers

Four trainers were involved in the training events organised by CUB. Three of them participated in the first edition of the training, and all four in the second edition. All of them were members of the CUB team of the "FERTILE" project. Among the trainers, there were 3 females and one male. All of them had prior experience with teaching educational robotics, and computer science and informatics, see Table 5.1, some of them teach at different levels of education at the same time.

Table 5.1: Number of trainers teaching particular subjects per Educational level (CUB)

Educational level / subjects	Primary Education	Lower Secondary Education	Upper secondary Education	Higher Education	after-school clubs	Adult Education
ER		1	2	2	1	2
CS/inf		1	2	4		3
arts						
other						

Two trainers from the CUB team were young teachers with 0-5 years of experience. One had less than 15 years of experience, and another one had more than 15 years of experience, see Table 5.2.

Table 5.2: Years of trainers' teaching experience (CUB)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers		2		1	1

Table 5.3: Percentage of training events the trainers lectured (CUB)

	less than 20 %	20 - 40 %	41 - 60 %	61 - 80 %	more than 80
number of trainers	1	1	1	1	

Trainees

Altogether, 41 trainees participated in two training events organised by CUB. Of them, 24.4% were male (8 males in the first edition and 2 in the second edition) and 75.6% were female participants (15 in the first and 16 in the second editions).

Notably, Slovak teachers teach at least two subjects and often teach at more than one level. In this line, our trainees originated from all educational levels. Most of them taught at lower secondary (up to 90.2%), followed by upper secondary (68.3%), primary (40.9%) and Higher education (12.2%). In terms of subjects taught, computer science was taught by 87.8%, arts by 51.2% and other subjects by 75.6% of them.

Table 5.4: Number of trainees teaching particular subjects per Educational level (CUB)

Educational level / subjects	Primary Education	Lower Secondary Education	Upper secondary Education	Higher Education
ER				
CS/inf	9	15	10	2
arts	6	9	5	1
other	3	13	13	2

4.1.2 CUP

Trainers

In the CUP training events there participated 2 male trainers. One is a member of the FERTILE team and has been participating in the "FERTILE" project. The second one participated in the pilot study and was well-prepared for the trainer role. Both of them had experience teaching CS/Informatics, see Table 5.5. Both of them had more than 10 years of teaching experience, see Table 5.6.

Table 5.5: Number of trainers teaching particular subjects per Educational level (CUP)

Educational level / subjects	Primary Education	Lower Secondary Education	Upper secondary Education	Higher Education	after-school clubs	Adult Education
ER	1			1	1	
CS/inf	1			2	1	
arts						
other						

Table 5.6: Years of trainers' teaching experience (CUP)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers				1	1

Table 5.7: Percentage of training events the trainers lectured (CUP)

	less than 20 %	20 - 40 %	41 - 60 %	61 - 80 %	more than 80
number of trainers			1	1	

Trainees

The CUP research team organised 3 editions of training events. The total number of participants was 40, of which 13 were in Group A, 11 in Group B and 16 in Group C.

Out of the 40 participants, 23% were men (9 men) and 78 % were women (31 women). Regarding the educational level they taught, 85% (34) originated from Primary education and 15% (6) from Secondary education. In the Czech Republic, teachers usually teach two subjects and sometimes teach at more than one level, therefore in Table 5.8, they could be counted more than once.

Table 5.8: Number of trainees teaching particular subjects per Educational level (CUP)
(Only 7 out of 40 trainees completed the feedback questionnaire).

Educational level / subjects	Primary	Lower secondary	Upper secondary	Higher Education
ER				
CS/inf	1	2	2	
arts		1	1	
other	1	1	1	

4.1.3 UniWA

Trainers

The training event in Greece was facilitated by five (5) experienced trainers all members of the UniWA research team. All the members were female. Each trainer contributed with her ER or Arts or Learning Design expertise in developing the training materials and supporting the participants. Four out of five trainers were actively involved in all the sessions, supporting trainees and contributing to the very positive atmosphere of the event.

Table 5.9: Number of trainers teaching particular subjects per Educational level (UniWA)

Educational level / subjects	Primary	Lower Secondary	Upper Secondary	Higher	after-school clubs	Adult
ER	2	1	1	2	1	
CS/inf	1	1	2	1		1
arts				1		
other						

Table 5.10: Years of trainers' teaching experience (UniWA)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers					5

Table 5.11: Percentage of training events the trainers lectured (UniWA)

	less than 20 %	20 - 40 %	41 - 60 %	61 - 80 %	more than 80
number of trainers	3	1	1		

Trainees

From the 49 participants of the Greek training event, 10,2% were men (4 men) and 91,8 % were women (45 women). Regarding the educational level they teach, four (4) were from Higher Educationducation, seventeen (17) from Primary Educationducation, eighteen (18) from Secondary education, and ten (10) pre-service educators who did not have a permanent position at the time the multiplier event was carried out. In terms of educators' disciplines, there was a relative balance as 57.1% (28 trainees) were educators related to ER and 42.9% (21 trainees) related to Arts. Table 5.12 shows in more detail the educators' disciplines and educational levels.

Table 5.12: Number of trainees teaching particular subjects per Educational level (UniWA)

Educational level / subjects	Primary Education	Lower Secondary Education	Upper secondary Education	Higher Education
ER	8	5	3	4
CS/inf	6		2	
arts	13	4	3	1
other				

4.1.4 URJC

Trainers

A team of three experienced trainers realised the training, consisting of two male and one female, all active members of the "FERTILE" project team. Their combined expertise and deep involvement in the project ensured high-quality instruction and comprehensive support for participants throughout the training.

Table 5.13: Number of trainers teaching particular subjects per Educational level (URJC)

Educational level / subjects	Primary	Lower Secondary	Upper secondary	Higher	after-school clubs	adult
ER				2		
CS/inf				3		
arts						
other						

Table 5.14: Years of trainers' teaching experience (URJC)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers			1		2

Table 5.15: Percentage of training events the trainers lectured (URJC)

	less than 20 %	20 - 40 %	41 - 60 %	61 - 80 %	more than 80
number of trainers		2			1

Trainees

A total of 111 participants attended the training. Among them, 58 were female (52.3%) and 53 were male (47.7%), showcasing a balanced representation of genders. This distribution reflects a commendable level of gender diversity and inclusivity in the training session.

Table 5.16: Number of trainees teaching particular subjects per Educational level (URJC)

Educational level / subjects	Primary ducation	Lower secondary Education	Upper secondary Edication	Higher Education
ER	4	11	7	4
CS/inf	10	7	8	6
arts	2	1	0	0
other	23	6	14	7

4.1.5 UVa

Trainers

The two editions of the UVa training activities (see section 4.1.5) were delivered by a team of three experienced trainers, consisting of two males and one female, all of whom are active members of the FERTILE project. Note that trainers at the UVa events are the same as in the URJC training events, while data regarding members of the UVa research team are omitted since they played complementary roles through the support of the trainers. Their combined expertise and deep involvement in the project ensured high-quality instruction and comprehensive support for participants throughout the training.

Table 5.17: Number of trainers teaching particular subjects per Educational level (UVa)

Educational level / subjects	Primary	lower secondary	upper secondary	higher	after-school clubs	adult
ER				2		
CS/inf				3		
arts						
other						

Table 5.18: Years of trainers' teaching experience (UVa)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers			1		2

Table 5.19: Percentage of training events the trainers lectured (UVa)

	less than 20 %	20 - 40 %	41 - 60 %	61 - 80 %	more than 80
number of trainers		2			1

Trainees

The training had 57 trainees, but due to the evidence submission deadline, only 20 have completed all the forms. Of these 20 trainees, 17 were women (85%) and 3 were men (15%).

Table 5.20: Number of trainees teaching particular subjects per Educational level (UVa)

Educational level / subjects	Primary Education	Lower Secondary Education	Upper secondary Education	Higher Education
ER	6	7	5	2
CS/inf			3	
arts	1			
other	6			

4.2 Summary of the research sample descriptive data

In all countries, the trainers were ER or Computer Science/Informatics teachers on various levels. There was only one Greek trainer who specialised in Arts. Together, there were 17 trainers, only one of them (from CUP) was not a member of the "FERTILE" project, but he was a participant in the pilot. 58,8% (10) were females. A total of 298 trainees participated in the "FERTILE" training across all events. However, due to incomplete data from the UVA and CUP training events, the sample size for analysis is adjusted. Specifically, only 20 out of 57 participants at the events organised by UVa and 8 out of 40 participants at the events organised by the CUP provided feedback by completing the questionnaires. Therefore, we report the analysis on the 217 participants who provided complete data. In Table 5.21, we can see years of trainers' teaching experience. It is obvious that every trainer has at least some teaching experience, and most of them (11) have more than 15 years of teaching experience.

Table 5.21: Years of trainers' teaching experience (all training events)

years of teaching experience	0 - not a teacher	0-5	6-10	11-15	more than 15
number of trainers		2	2	2	11

Table 5.22 shows the number of trainers and trainees per partner. The training event organised by URJC had the most trainees (111). 10 out of 17 trainers were females, and 182 from 261 trainees were females.

Table 5.22: Numbers of trainers and trainees (all training events) (* in UVa we have information about gender only from 20 trainees who answered the questionnaire)

partner	CUB	CUP	UniWa	URJC	UVA	SUM
number of trainers (female)	4 (3)	2 (0)	5 (5)	3 (1)	3 (1)	17 (10)
number of trainees (female)	41 (31)	40 (31)	49 (45)	111 (58)	57/20 (17)*	261 (182)

As the project aims at Arts and Computer science/Informatics/Educational robotics teachers, based on data in Table 5.23, we claim that training events successfully included all these teachers. Trainees taught at different educational levels, the majority at primary and lower secondary levels. Differences between the subjects they taught is mostly based on each country's curriculum. For example, no subject is called Educational Robotics in Slovakia or the Czech Republic. In Spain, only a few trainees taught Arts (4), but many trainees taught other subjects (96).

Table 5.23: Number of trainees teaching particular subjects (all training events) (some trainees are counted more than once, as they teach different subjects and/or at different levels)

Educational level / subjects	Primary Education	Lower secondary Education	Upper secondary Education	Higher Education	SUM
ER	18	23	15	10	66
CS/inf	26	24	25	8	83
arts	22	15	9	2	48
other	33	20	28	9	90
SUM	99	82	77	29	

4.3 Data Collection

Two questionnaires were prepared to collect data on the Training events - one for trainees and one for trainers.

The questionnaire for trainees was divided into several sections. In addition to a few personal details, it asked the trainees to evaluate the content, training schema, and organization of the training, as well as to self-evaluate their project and comment on their teamwork.

In the questionnaire for trainers, they provided data related to their profession, answered questions about the difficulty of preparing for the training, commented on the arrangement of topics compared to the pilot training, discussed the difficulty of the training from their point of view, the interest of the training topics for the trainees, and also evaluated the Artful ER projects of the trainees.

In addition to analysing the questionnaire data, each partner institution was asked to complete tables of quantitative and qualitative indicators of training event success.

4.4 Data Analysis and Findings

4.4.1 CUB

Trainers

Four trainers facilitated the training events organised by CUB. Each trainer lectured a different range of the training, from less than 20% to 61-80%. Two trainers reported that preparation for training required moderate effort (3 points on a 1-5 scale), and the remaining two declared less or little effort (2 points and 1 point on a 1-5 scale). All four equally stated that they went through 71-80% of the prepared materials in the training. Only three trainers responded to the question about the new arrangement of topics, as the fourth did not participate in the pilot training. Since the arrangement of topics in the training more or less matched the arrangement of topics in the pilot training at CUB, all three trainers described it as the same as it was previously.

Table 5.24: How much time did it take CUB trainers to:

n=4	less than 1,5 hours	1,5 - 3 hours	more than 3 hours
prepare for lectures on average	3	1	
check the students' HW after each meeting	1	3	

Trainees

Table 5.25: To which training topics would trainees allocate more/less time (CUB)

n =41	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	15	35	3	25	2	9	
less time	2	3	11	3	18	8	

Qualitative Data Analysis

On which topics trainees would allocate more/less time?

Slovak trainees would allocate **more time** to Educational Robotics (35 responses), Robotics Simulators (25 responses) and Computational Thinking (15 responses) - see Table 5.25.

Although they generally marked more than one topic in their response, they commented mostly on Robotics. Their answers on this topic mainly expressed a *lack of experience* in this area: "*There are many robots and even if they were shown to us, one would like to try several of them*", "*...more opportunities to work with specific robots*", "*I would welcome more demonstrations of different robots that I could be inspired by*", "*so that I could get acquainted with the latest developments in the field of robotics and so that I could try robots in practice*", "H*owever, I would like to try all the robots and learn how to work with them.*", "I *would accept a larger time allocation for introducing different robots that can be used in teaching, their programming.*", "*Working more with robots, trying out several types of robots so that I could rely on experience when choosing a project.*", "*We have tried few robots in practice ... it is more difficult for me to choose which one I would like to introduce to the students.*"

When it comes to simulators, it was not only a *lack of experience*, but also a *lack of knowledge* in this area: "*try more so that I can better consider what to use at school*", "*however, I would like to get acquainted with more, try how they work so that I can use them later*", "l*earn to work in a simulator, create a mini project for myself, e.g., according to a worksheet*" and also the *personal preferences* of some trainees: "*the simulators were excellent, I liked this topic*", "t*here are never enough simulators :)*", "*This topic is key for developing practical skills in the field of engineering and technology, which is very important for preparing students for future careers in rapidly developing technical fields.*", "*simulators are great if we don't have enough robots at school*."

The topic of computational thinking was chosen mainly by trainees, for whom it was a completely new concept, so in this case too, the main reason for their answer was a *lack of knowledge*: "*I had to do some more studies on computational thinking by myself*", "*I chose computational thinking and robotics because they are important areas that help students better understand technology and logical thinking.*", "*programming robots is related to computational thinking*", "*I am most interested in programming and developing computational thinking.*"

In terms of topics that trainees would allocate **less time** to, only Platform (18 responses) and Arts (11 responses) were mentioned more than 10 times - see Table 5.25. Several trainees responded that they would not shorten time for any topic because "e*verything follows nicely and requires its own time and I see everything equal in terms of time allocation*", "*I had the impression that a smaller time allocation for any of the areas was not welcome*", "*I can't pick one, everything was important*", "*Shortening would mean not getting to know the topic*". Many of those who reported that they would shorten a topic justified this by stating that it would free up more time for other topics, particularly robotics or project development ("*Focus more on practical work with robots*").

Those who identified the Platform topic as suitable for shortening justified it mainly by its intuitiveness and the common use of similar systems so far: "*I think the platform is quite intuitive, there is no need to spend a lot of time explaining it, we could do the development and design of the project directly in the platform and share it with the teachers*", "*I would probably spend the least time on the platform, because it is easy enough to understand and in fact we are already working with these*

environments a lot nowadays", "*the video was quite sufficient to understand the platform*". One of the trainees doubted whether he would continue to use it in the future.

Regarding the Art topic, most of the justifications were directed towards the fact that other topics (especially robotics) are more important and there is no time to develop art in informatics classes: "*In the conditions of secondary school, it often happens that there is no time to develop art in informatics classes*", "*...only if we have enough experience with robotics we can create art projects*", "*I consider robotics to be the key topic, and the area of art (in my opinion) is sufficient in a brief overview*."

Activities ordering

Regarding the order of the activities, the vast majority of trainees expressed that they were comfortable with the order of the activities and would not change anything. Instead of changing the order, some suggested adding some activities, again mainly with robots ("*I would not change the order of the activities. I would just add more activities with robots.*"), or more information about the FERTILE methodology and projects ("*I would add one more online training about the fertile methodology, maybe some examples of projects*").

One participant suggested: "*starting the training by introducing robots and trying out more robot kits.*"

Two suggestions related to moving the topic of simulators to earlier: "*I would put the simulators right away to work with the robots*", " *Introducing the Roberta simulator could be before the project assignment*", and two suggestions highlighted the importance of including videos earlier: "*Giving info on the importance of watching the videos and processing the analysis from the videos definitely much earlier than the project assignment*" and "*I would have included the videos somewhere at the beginning of the training, personally it would have helped me in getting an idea of what the project should look like and made it easier to create, analysing them could have been done later, as it was when we already knew more about the methodology*".

In Table 5.26 we can see that, on average, the trainees were satisfied with the division of learning modality during training.

Table 5.26: To what extent did particular forms of learning suit the trainees (CUB)

n=41	would prefer maximally (2)	would prefer more (1)	satisfied (0)	would prefer less (-1)	would prefer minimally (-2)	average
online - synchronous	3	4	29	4	1	0.1
in-person synchronous	4	7	28	1	1	0.29
asynchronous	2	3	29	5	2	-0.05

Training Content

On the one hand, trainees were mostly satisfied with the training contents. They found it interesting and innovative, and probably not problematic. See Table 5.26. On the other hand, trainers found it innovative and were not sure if it was problematic.

Table 5.27: How trainees and trainers consider the training content (CUB)

	nt = 41 nT = 4	absolutely not (-2)	probably not (-1)	hard to say (0)	probably yes (1)	definitely yes (2)	average
interesting	trainees	0	0	0	12	29	1.71
	trainers				1	3	1.75
useful	trainees	0	1	1	14	25	1.54
	trainers					4	2
innovative	trainees	0	0	2	8	31	1.71
	trainers			1	2	1	1
problematic	trainees	14	12	7	5	3	-0.71
	trainers			4			0

Trainees were asked to rate topics (computational thinking, robotics, art, simulators, platform, project design and development) of the training in terms of difficulty, where trainers rated them from the point of view of the demands on trainees. The biggest differences were in platform and simulators, where for trainees it was adequate, but trainers thought it was more difficult for trainees. The most difficult topics for trainees was project development, the least difficult was platform. Trainers found the platform to be the most difficult for trainees, the least difficult they found art and robotics, see Table 5.28.

Table 5.28: How trainees and trainers rate the training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (CUB)

	nt = 41 nT = 4	extremely difficult (-2)	difficult (-1)	adequate (0)	easy (1)	extremely easy (2)	average
computational thinking	trainees	1	9	26	4	1	-0.12
	trainers		3	1			-0.75
robotics	trainees	0	9	26	4	2	-0.02
	trainers			3	1		0.25
art	trainees	3	4	26	7	1	-0.02
	trainers			3	1		0.25
simulators	trainees	2	3	30	5	1	0
	trainers		3	1			-0.75
platform	trainees	2	6	18	12	3	0.2
	trainers	1	3				-1.25
project design and development	trainees	4	15	21	1	0	-0.54
	trainers		4				-1

Artful ER projects

Trainers were mostly satisfied with Artful ER projects from trainees. They rated robot involvement in projects as the best and use of simulators as worst - but it was still moderate, see Table 5.29.

Table 5.29: How trainers assessed the overall quality of the submitted projects (CUB)

n = 4	insufficient (-2)	poor (-1)	moderate (0)	good (1)	perfect (2)	average
computational thinking			1	2	1	1
robots involvement				3	1	1.25
arts content			1	3		0.75
use of simulators			4			0

Trainees also assessed their projects and how they included these topics in them. They were mostly satisfied with everything - the average is at the level of *well*, see Table 5.30.

Table 5.30: How trainees assessed their success in including particular topics in their Artful ER project (CUB)

n = 41	not successful (-2)	poorly successful (-1)	adequately(0)	well (1)	perfectly (2)	average
computational thinking	0	0	13	21	7	0.85
use of robots	0	1	11	16	13	1
arts content	0	2	11	16	12	0.93
simulators	1	4	11	19	6	0.61

Trainees worked on the projects in pairs. One of the questions from the questionnaire was to assess how they worked. Only 17 trainees answered this question because of technical issues. They mostly agreed that they didn't mind working together on the project and that working in pairs was enriching for them. They rather disagree that it was difficult for them.

Table 5.31: How trainees assessed the work on the project in pairs (CUB)

n = 17	completely disagree (-2)	rather disagree (-1)	don't know (0)	rather agree (1)	completely agree (2)	average
I liked working together on the project.	1	0	0	5	11	1.47
Working together on the project was enriching for me.	0	0	0	6	11	1.65
I didn't mind working together on the project.	0	0	1	3	13	1.70
While working together on the project, I learned something from my colleague.	0	0	0	9	8	1.47
Working together on the project was difficult.	6	7	1	2	1	-0.88

In Table 5.32 we see that the majority (72%) of trainees knew their project partner prior to the training. All of them were satisfied with working in pairs, and mostly (77,8 %) worked on the project together.

Table 5.32: How trainees assessed the statements about the pair work on the project (CUB)

n = 18	number of participants who agree	%
I worked well in a pair.	18	100%
I would rather work alone.	0	0%
I like working in a pair, but working with my partner did not suit me.	0	0%
I knew my partner before this training.	13	72.2%
We divided the work and each of us worked on our part independently.	1	5.6%
We worked on the project together.	14	77.8%
We worked separately on some parts of the project and together on other parts.	8	44.4%
I worked on the greater part of the project.	1	5.6%
My partner worked on the greater part of the project.	0	0%

Satisfaction with the training

The trainers assessed their satisfaction with aspects of the training event, along with the trainees' satisfaction as they perceived it. Trainers from CUB were mostly satisfied, except for the platform (-0.75). The lowest score for trainees' satisfaction was in time allocation - but it is still above 0.

Table 5.33: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs (CUB)

	nT = 4	totally satisfied (2)	satisfied (1)	not satisfied, nor unsatisfied (0)	unsatisfied (-1)	totally unsatisfied (-2)	average
training schema	trainees		3	1			0.75
	trainers	2	2				1.5
time allocation	trainees		1	3			0.25
	trainers	2	2				1.5
content	trainees		4				1
	trainers		4				1
teamwork	trainers	1	3				1.25
FDM	trainers		4				1
platform	trainers			1	3		-0.75

Trainees in CUB training were satisfied with different aspects of TE. They were mostly satisfied with the expertise and willingness of lecturers (both 1.85). Availability of robotic equipment got the lowest score (1.17), but it is still more than good.

Table 5.34: Evaluation of different aspects of TE by trainees (CUB)

n = 41	very good (2)	good (1)	average (0)	bad (-1)	very bad (-2)	average
Expertise of lecturers	36	4	1	0	0	1.85
Willingness of lecturers	36	4	1	0	0	1.85
Premises	31	10	0	0	0	1.76
Availability of robotic equipment	19	12	8	2	0	1.17
Time schedule	16	17	8	0	0	1.20
Study materials (self-study)	19	18	4	0	0	1.37
Learning activities (synchronous learning)	20	12	9	0	0	1.27

Training Events Indicators

Table 5.35: Quantitative Indicators for the "FERTILE" Training events organised by CUB

Quantitative Indicator	Number
The number of registered trainees	53
The number of active trainees who completed the training	41
The number of dropouts	0
The number of artful projects completed and submitted by participants	21*
The number of projects for ER + Music	6
The number of projects for ER + Painting	10
The number of projects for ER + Drama	1
The number of projects for ER + Literature	1
The number of projects for ER + Dancing	2
The number of projects for ER + Arts and Crafts	3
The number of projects for ER + others	4
The number of primary schools involved	20
The number of secondary schools involved	16
The number of universities involved	0

*As a number of projects combined robotics with several other art forms, the sum of the projects in each category is greater than the total number of projects.

Table 5.36: Qualitative Indicators for the "FERTILE" Training events organised by CUB

Qualitative Indicator	Indicative Quotes
Assessment of event organisation	"The organization of the training was highly professional." "The training was well organized, including robotic equipment - robots that we could try out." "...everything had its own system and the deadlines were clear, so it was easy to navigate." "The program was clearly structured, the tasks were clearly explained, and all activities were logically connected. I also appreciate the ample time for practice and discussion."
Assessment of accessibility of training content	"Access to the materials was seamless, we could return to the tasks at any time." "It was not a problem to get to them, they were clear and easy to navigate." "...I found all the activities I wanted to see there without any problems." "The materials were very accessible and clearly organized. They were prepared in a way that was understandable even for beginners, but at the same time offered sufficient depth for those who already had experience with the topic."
The participants' interaction with colleagues	"I liked that the tasks and assignments were for team solutions, we were able to inspire each other, help each other, and give advice." "The cooperation with classmates was dynamic."

	"Collaboration with classmates was very stimulating. Group activities were well-structured and supported teamwork."
The participants' interaction with instructors	"I really liked that there were several teachers on the training, which added good dynamics to the training, they approached each team individually, since there were more of them at the seminar, they covered all our needs." "We communicated through messages on the platform. Feedback from teachers was prompt." "The teachers were helpful, when something needed to be solved or asked a question, they were always willing to advise." "The teachers were helpful, willing to answer questions and provide feedback. They had a great overview of the field and were able to explain even more challenging concepts in an understandable way."
The participants' overall satisfaction with the learning experience	"I was very satisfied with the level of the training, I learned a lot, the fertile platform allowed me to look at other projects, the methodology and the complete project processing in one place. For a while, the robot in combination with art became a part of life at our school…" "The training was interesting and gave me a new perspective on the connection between technology and creativity. I am glad that I participated in it." "The overall impression was excellent, maybe if there was more time to try out more robots it would be nice." "I took away an excellent impression from the training. It was not only informative but also creative and interactive. The combination of robotics with art is very inspiring and brought me new perspectives on the use of technology in education. I leave with many new knowledge and ideas that I will use in practice."
Overall satisfaction of instructors with the course of training	"I consider the training very successful because several teachers implemented the proposed projects in their schools even though they did not have to. The Art teachers were especially delighted because such training was unconventional and enriching. " "The training was interesting for the teachers, some topics were completely novel for them. Even computational thinking was not a topic they didn't know. I was surprised that several teachers were unaware that CT is everywhere. The most controversial topic was probably simulators. Some rejected the simulators, others liked them."

4.4.2 CUP

Trainers

Both CUP trainers are well experienced (15 and 39 years of teaching). They mostly cooperated during events, so the first one lectured 41-60%, and the second 61-80%. In the events, they used up to 70% of the available training materials. Regarding the training event, they considered the content useful and probably innovative for the participants' practise. They both considered 'Involving simulators' and 'Project development' to be the most difficult topics for the participants. They found all the other topics moderate or easy.

Table 5.37: How much time did it take CUP trainers to:

n = 2	less than 1,5 hours	1,5 - 3 hours	more than 3 hours
to prepare for lectures on average	1	1	
to check the students' HW after each meeting	1	1	

Trainees

Table 5.38: To which training topics would trainees allocate more/less time (CUP)

n = 8	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	1	2	2	2	0	2	
less time	2	1	0	3	1	0	

Qualitative Data Analysis

Czech trainees would allocate **more time** to project design and development (2 responses) - see Table 5.38. Their answers on this topic mainly expressed a *lack of experience designing in the CP platform.* One participant stated, "*It's quite a complex tool. I would have to create more projects like this to see if anything is missing or missing".* Also, they required more time on Robotics (2 responses) - see Table 5.38. One participant stated, "*Maybe more time to come up with a new activity, hence more time to work with robots.*"

Notably, one participant did not appreciate the interdisciplinary approach to ER and Arts stating "*It seemed to me that robotics was being forcibly bolted onto art. Instead of helping, it brings artificial and unnecessary challenges.*"

In Table 5.39 we can see that on average participants were satisfied with the division of learning modality during training, some of them would prefer more in-person synchronous learning.

Table 5.39: To what extent did particular forms of learning suit the trainees (CUP)

n=8	would prefer maximally	would prefer more	satisfied	would prefer less	would prefer minimally	average
online - synchronous		1	4		3	0,625
in-person synchronous	2		5	1		-0,375
asychronous			7		1	0,25

Training Content

On the one hand, trainees were mostly satisfied with the contents of the training, they found it interesting. See Table 5.26. On the other hand, the trainers found it definitely interesting and useful. Both trainers and trainees were not sure if it was problematic.

Table 5.40: How trainees and trainers consider the training content (CUP)

	nt = 8 nT = 2	absolutely not	probably not	hard to say	probably yes	definitely yes	average
interesting	trainees			1	3	4	1,375
	trainers					2	2
useful	trainees			3	2	3	1
	trainers					2	2
innovative	trainees		2		2	4	1
	trainers				2		1
problematic	trainees	1	2	3		2	0
	trainers			2			0

Trainees were asked to rate topics (computational thinking, robotics, art, simulators, platform, project design and development) of the training in terms of difficulty, where trainers rated them from the point of view of the demands on trainees. The biggest differences were in simulators and project development. The most difficult topics for trainees was project development, the least difficult were robotics and simulators. Trainers found simulators to be the most difficult for trainees, the least difficult they found art and robotics, see Table 5.41.

Table 5.41: How trainees and trainers rate training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (CUP)

	nt = 8 nT = 2	extremely difficult	difficult	adequate	easy	extremely easy	average
computational thinking	trainees		1	6	1		0
	trainers		1	1			-0,5
robotics	trainees		1	3	4		0,375
	trainers			1	1		0,5
art	trainees		2	4	2		0
	trainers			1	1		0,5
simulators	trainees		2	1	5		0,375
	trainers		2				-1
platform	trainees		1	5	2		0,125
	trainers			2			0
project design and development	trainees	1	5	2			-0,875
	trainers			2			0

Artful ER projects

Trainers were mostly satisfied with Artful ER projects from trainees, except use of simulators. Both of them rated it as poor, see Table 5.29.

Table 5.42: How trainers assessed the overall quality of the submitted projects (CUP)

n = 2	insufficient (-2)	poor (-1)	moderate (0)	good (1)	perfect (2)	average
computational thinking			1	1		0,5
robots involvement				2		1
arts content				2		1
use of simulators		2				-1

Trainees also assessed their projects and how they included these topics in them. They were unsatisfied with the use of simulators in their projects - the average is in the level of *well*, see Table 5.30.

Table 5.43: How trainees assessed their success in including particular topics in their Artful ER project (CUP)

n = 8	not successful (-2)	poorly successful (-1)	adequately(0)	well (1)	perfectly (2)	average
computational thinking		2	1	4	1	0,5
use of robots	1	2	2	3		-0,125
arts content	1	1	2	4		0,125
simulators	1	5	1	1		-0,75

Trainees worked on the projects in pairs. One of the questions from the questionnaire was to assess how they worked. They mostly agreed that they didn't mind working together on the project and that working in pairs was enriching for them. They were not sure if it was difficult for them.

Table 5.44: How trainees assessed the work on the project in pairs (CUP)

n = 8	completely disagree (-2)	rather disagree (-1)	don't know (0)	rather agree (1)	completely agree (2)	average
I liked working together on the project.		1	2	2	3	0,875
Working together on the project was enriching for me.			3	2	3	1
I didn't mind working together on the project.			3	2	3	1
While working together on the project, I learned something from my colleague.		5		1	2	0
Working together on the project was difficult.	2	2		3	1	-0,125

Table 5.45 shows that half of trainees knew their project partner before the training. They were mostly satisfied with working in pairs. Only one trainee would instead work alone. They used different strategies to collaborate on project work.

Table 5.45: How trainees assessed the statements about the pair work on the project (CUP)

n = 8	number of participants who agree	%
I worked well in a pair.	5	62.5
I would rather work alone.	1	12.5
I like working in a pair, but working with my partner did not suit me.	1	12.5
I knew my partner before this training.	4	50.0
We divided the work and each of us worked on our part independently.	3	37.5
We worked on the project together.	2	25.0
We worked separately on some parts of the project and together on other parts.	1	12.5
I worked on the greater part of the project.	1	12.5
My partner worked on the greater part of the project.	1	12.5

Satisfaction with the training

Trainers assessed their satisfaction with aspects of the training, along with trainees' satisfaction perceived by them. Trainers from CUP were mostly satisfied, mostly with teamwork.

Table 5.46: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs (CUP)

	nT = 2	Totally satisfied (2)	satisfied (1)	not satisfied, nor unsatisfied (0)	unsatisfied (-1)	totally unsatisfied (-2)	average
Training schema	trainees		2				1
	trainers		2				1
Time allocation	trainees		1	1			0.5
	trainers		1	1			0.5
Content	trainees	1	1				1.5
	trainers	1	1				1.5
Teamwork	trainers	2					2
FDM	trainers		1	1			0.5
Platform	trainers		1	1			0.5

Trainees in CUP training were satisfied with different aspects of TE. They were mostly satisfied with the expertise and willingness of trainers. Time schedule got the lowest score (0.88) but is still above average.

Table 5.47: Evaluation of different aspects of TE by trainees (CUP)

n = 8	very good (2)	good (1)	average (0)	bad (-1)	very bad (-2)	average
Expertise of lecturers	6	2				1.75
Willingness of lecturers	7	1				1.88
Premises	4	3		1		1.25
Availability of robotic equipment	3	3	1	1		1
Time schedule	2	4	1	1		0.88
Study materials (self-study)	4	2	2			1.25
Learning activities (synchronous learning)	2	4	2			1

Training Events Indicators

Table 5.48: Quantitative Indicators for the "FERTILE" Training Events organised by CUP

Quantitative Indicator	Number
The number of registered trainees	40
The number of active trainees who completed the training	31
The number of dropouts	9
The number of artful projects completed and submitted by participants	8
The number of projects for ER + Music	1
The number of projects for ER + Painting	6
The number of projects for ER + Drama	2
The number of projects for ER + others	0
The number of primary schools involved.	10
The number of secondary schools involved.	6
The number of universities involved.	0

Table 5.49: Qualitative Indicators for the "FERTILE" Training events organised by CUP

Qualitative Indicator	Indicative Quotes
Assessment of event organisation	"Using Moodle as a support to organise communication and structuring event by phases was good idea", "more time in f2f session would be better but also problematic for teachers to allocate time"
Assessment of accessibility of training content	"relatively good clarity", "I appreciate the ability to filter projects by multiple criteria", "quite a bit of "mouse clicking" before I get to things, but it's probably necessary for the sake of systematization"
The participants' interaction with colleagues	"It's a great idea that, for a good result, requires time spent together over robots."
The participants' interaction with instructors	"trainees were opened to discuss and were active", "trainers provided friendly space for interaction"
The participants' overall satisfaction with the learning experience	"sharing, inspiration", "good source of inspiration at international level."
Overall satisfaction of instructors with the course of training	"good materials"

4.4.3 UniWA

Trainers

Four out of five trainers reported that they made moderate effort to prepare their lectures while one reported that they made a lot of effort. In addition, three trainers reported that during their lectures they used 61-70% of the training materials, whereas the other two used 71-80% of the material. Regarding the new arrangement of topics in the training event, two trainers found it significantly better, one that remained the same and one somewhat worse.

Table 5.50: How much time did it take UniWA trainers to:

n=5	less than 1,5 hours	1,5 - 3 hours	more than 3 hours
to prepare for lectures on average	1	1	3
to check the students' HW after each meeting	1	1	3

Trainees

The data presented and analysed below refer to 37 of the 49 participants (trainees) who completed the training event evaluation questionnaires. Regarding gender, 10,2 % were men (4 men) and 89,8 % were women (33 women).

Table 5.51: To which training topics would trainees allocate more/less time (UniWA)

n = 37	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	15	21	12	16	8	18	1
less time	7	4	9	7	10	2	9

Qualitative Data Analysis

On which topics trainees would allocate more/less time?

As shown in Table 5.51, Greek trainees would allocate **more time** to Educational Robotics (21 responses), Project Design and Development (18 responses), and Robotics Simulators (16 responses). Their qualitative data analysis shows that the main reasons that led to these selections are a) personal interest and b) lack of knowledge. Regarding personal interest, there are many responses such as *"These are two fields that interest me the most"*, "*I find it very interesting"*, *"...are more directly relevant to my subject and I would be interested to see more ideas and material"*. Concerning the lack of knowledge, several responses mention the lack of practice *"I would like to practice more on this part"* , familiarity *"I am not familiar with this field*" and lack of expertise *"Lack of expertise", "I don't have much knowledge".* Regarding the Project Design Development, there are two notable comments about why they would allocate more time. *"The Artful ER project is based on the design"* and "*There wasn; t enough time for a complete project".*

Regarding the topics that the trainees would allocate **less time to, as shown in Table 5.51,** there are fewer responses. This is explained by qualitative analysis as several trainees suggest that they would not change the time allocation of the activities. Some responses are indicative. "I would not have less time somewhere" , *"I do not think that more time was allocated somewhere than was needed"*, *"Nowhere less time. We needed the time you gave us for everything"*. Of the responses suggesting less time, the largest number of responses were concentrated on FERTILE Community Platform (10 responses) and Arts (9 responses). The trainees found the platform easy to use *" Getting familiar with the platform was easy" , "I would spend less time because I find it quite understandable to use the community platform".* Regarding Arts many trainees would allocate less time time because they considered themselves already familiarised due to their teaching subjects. *"I already know a lot about literature", "I am very familiarized".*

Activity ordering

From a qualitative analysis of the data on the order of the activities, 91,9% of the Greek trainees indicated that they would not change anything. Three (3) trainees commented that they would prefer some activities to be done face-to-face. *"I will not change the order of activities. The only thought is that it might be more useful (though considerably more difficult)* if the last phase of the event were implemented face-to-face". Another trainee adds that *"Online meetings always lack ... just because they are online".*

In Table 5.52, we can see that, on average the participants were satisfied with the division of learning modality during training.

Table 5.52: To what extent did particular forms of learning suit the trainees (UniWA)

n=37	would prefer maximally (2)	would prefer more (1)	satisfied (0)	would prefer less (-1)	would prefer minimally (-2)	average
online - synchronous	4	7	19	3	4	0.11
in-person synchronous	9	11	11	2	4	0.51
asychronous	2	6	16	7	6	-0.24

training content

Table 5.26 presents data from trainers' and trainees' questionnaires. Both trainers and trainees found the training interesting, useful, innovative and not problematic.

Table 5.53: How trainees and trainers consider the training content (UniWA)

	nt =37 nT = 5	absolutely not (-2)	probably not (-1)	hard to say (0)	probably yes (1)	definitely yes (2)	average
interesting	trainees				3	34	1.92
	trainers					5	2
useful	trainees				3	34	1.92
	trainers					5	2
innovative	trainees		1		5	31	1.78
	trainers				3	2	1.2
problematic	trainees	31	3			3	-1.6
	trainers	5					-2

Trainees were asked to rate topics (computational thinking, robotics, art, simulators, platform, project design, and development) of the training in terms of difficulty, and trainers rated them from the point of view of the demands on trainees. The most significant differences were in simulators and computational thinking. The trainees found it easy, but trainers thought it was not adequate for trainees. The least difficult topic for trainees was the platform. Trainers found simulators to be the most difficult for trainees, see Table 5.54.

Table 5.54: How trainees and trainers rate training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (UniWA)

	nt = 37 nT = 5	extremely difficult (-2)	difficult (-1)	adequate (0)	easy (1)	extremely easy (2)	average
computational thinking	trainees		2	15	12	8	0.70
	trainers		2	2		1	0.0
robotics	trainees		4	10	13	10	0.78
	trainers			3	2		0.40
art	trainees		2	16	8	11	0.76
	trainers			2	2	1	0.80
simulators	trainees	1	5	10	12	9	0.62
	trainers		2	3			-0.4
platform	trainees		1	7	16	13	1.11
	trainers			1	4		0.80
project design and development	trainees		2	16	17	2	0.51
	trainers		2	2	1		0.0

Artful ER projects

Trainers were mostly satisfied with the Artful ER projects designed by the trainees. They rated arts content in projects as the best and the use of simulators as the worst - but it was still good, see Table 5.55.

Table 5.55: How trainers assessed the overall quality of the submitted projects (UniWA)

n = 5	insufficient (-2)	poor (-1)	moderate (0)	good (1)	perfect (2)	average
computational thinking				2	3	1.6
robots involvement				3	2	1.4
arts content				1	4	1.8
use of simulators			2	2	1	0.8

Trainees also assessed their projects and how they included these topics in them. They were least satisfied with using simulators in their projects, see Table 5.56.

Table 5.56: How trainees assessed their success in including particular topics in their Artful ER project (UniWA)

n =37	not successful (-2)	poorly successful (-1)	adequately(0)	well (1)	perfectly (2)	average
computational thinking			10	15	12	1.05
use of robots			11	15	11	1
arts content		2	9	11	15	1.05
simulators	2	9	9	13	4	0.22

Trainees worked on the projects in pairs. One of the questions from the questionnaire was to assess how they worked. They mostly agreed that they didn't mind working together on the project and that working in pairs was enriching for them. They somewhat disagree that it was difficult for them.

Table 5.57: How trainees assessed the work on the project in pairs (UniWA)

n = 37	completely disagree (-2)	rather disagree (-1)	don't know (0)	rather agree (1)	completely agree (2)	average
I liked working together on the project.			5	12	20	1.40
Working together on the project was enriching for me.			9	9	19	1.27
I didn't mind working together on the project.			7	7	23	1.43
While working together on the project, I learned something from my colleague.		1	5	10	21	1.38
Working together on the project was difficult.	22	7	5	2	1	-.1.27

Table 5.58 shows that almost half of the trainees (48,6%) knew their project partner before the training. Most of them (81%) were satisfied with working in pairs, and they chose different strategies to work in pairs.

Table 5.58: How trainees assessed the statements about the pair work on the project (UniWA)

n = 37	number of participants who agree	%
I worked well in a pair.	30	81.0
I would rather work alone.	4	10.8
I like working in a pair, but working with my partner did not suit me.	5	13.5
I knew my partner before this training.	18	48.6
We divided the work and each of us worked on our part independently.	9	24.3
We worked on the project together.	16	43.2
We worked separately on some parts of the project and together on other parts.	21	56.7
I worked on the greater part of the project.	2	5.4
My partner worked on the greater part of the project.	6	16.2

Satisfaction with training

Trainers assessed their satisfaction with aspects of the training, along with trainees' satisfaction perceived by them. Trainers from UniWa were satisfied or totally satisfied with everything.

Table 5.59: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs (UniWA)

	n = 5	totally satisfied (2)	satisfied (1)	not satisfied, nor unsatisfied (0)	unsatisfied (-1)	totally unsatisfied (-2)	average
Training schema	trainees	3	2				1.6
	trainers	5					2
Time allocation	trainees	2	3				1.4
	trainers	3	2				1.6
Content	trainees	3	2				1.6
	trainers	5					2
Teamwork	trainers	4	1				1.8
FDM	trainers	4	1				1.8
Platform	trainers	3	2				1.6

Trainees in UniWa training were satisfied with different aspects of TE. They were least satisfied with the availability of robotic equipment (1.16), but it is still more than good.

Table 5.60: Evaluation of different aspects of TE by trainees (UniWA)

n = 37	very good (2)	good (1)	average (0)	bad (-1)	very bad (-2)	average
Expertise of lecturers	36	1				1.97
Willingness of lecturers	36	1				1.97
Premises	26	9	2			1.64
Availability of robotic equipment	12	19	6			1.16
Time schedule	18	17	1	1		1.43
Study materials (self-study)	26	9	2			1.64
Learning activities (synchronous learning)	31	3	3			1.76

Training Events Indicators

Table 5.61: Quantitative Indicators for the "FERTILE" Training events organised by UniWA

Quantitative Indicator	Number
The number of registered trainees	49
The number of active trainees who completed the training	49
The number of dropouts	0
The number of artful projects completed and submitted by participants	20
The number of projects for ER + Music	5
The number of projects for ER + Painting	2
The number of projects for ER + Drama	5
The number of projects for ER + Literature	1
The number of projects for ER + Cinema	1
The number of projects for ER + Arts and Crafts	5
The number of projects for ER + others	1
The number of primary schools involved.	19
The number of secondary schools involved.	18
The number of universities involved.	2

Table 5.62: Qualitative Indicators for the "FERTILE" Training events organised by UniWA

Qualitative Indicator	Indicative quotes
Assessment of event organisation	"I found the structure well-organized, with a logical flow that facilitated effective learning. The time allocation was appropriate, allowing for both content delivery and interaction. The content was relevant, well-designed, and met the participants' needs, ensuring a comprehensive learning experience".
Assessment of accessibility of training content	"We prepared a guide to organize the structure of the training following the main dimensions of the FERTILE Methodology and the FERTILE Results…So, we provided access to all the FERTILE training material, necessary for the session and the rest material available on the FERTILE site".
The participants' interaction with colleagues	"Trainees formed interdisciplinary teams from the very first f2f session involving in some cases more than two educators but always synthesizing ER with Arts."
The participants' interaction with instructors	"Participants provide positive feedback during the face-to-face and the online synchronous sessions"
The participants' overall satisfaction with the learning experience	"Based on my experience, the participants seemed highly satisfied with all aspects of the MEs"
Overall satisfaction of instructors with the course of training	"It was a very interactive and team-based journey! We asked the educators to implement their projects with students - many of them agreed - and we plan to organise an event in May to present and discuss their experience from enacting projects with students!"

4.4.4 URJC

Trainers

The training was conducted by three trainers, each contributing to its success through varying levels of time and effort. One trainer prepared their sessions in less than 1.5 hours, while the other two trainers spent more than 3 hours each. On average, the trainers rated the effort required to prepare the lectures as moderate, scoring 3 on a scale from 1 (minimal effort) to 5 (significant effort). Regarding the percentage of training materials covered during the practical sessions (MEs), the distribution was diverse: a certain number of trainers completed around 50% of the materials, while the other one reached higher levels of completion. Additionally, feedback on the new arrangement of topics was generally positive for those involved in the pilot training, reflected by an average rating near 1, indicating it was considered slightly to moderately better than the previous schema. These insights highlight the varying approaches and perceptions of the trainers, showcasing their adaptability and commitment to delivering the training effectively.

Table 5.63: How much time did it take URJC trainers to:

n = 3	less than 1,5 hours	1,5 - 3 hours	more than 3 hours
to prepare for lectures on average	1		2
to check the students' HW after each meeting	1	2	

Trainees

Table 5.64: To which training topics would trainees allocate more/less time (URJC)

n = 111	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	68	71	43	32	13	44	
less time	21	10	18	23	45	11	3

Qualitative Data Analysis

As part of the FERTILE project, we conducted a training combining robotics and art, offering various activities such as working with simulators, exploring platforms, and engaging in project design and development. A total of 111 participants provided feedback on the duration of these activities. The majority expressed a desire for more time in computational thinking (68) and robotics (71), while fewer participants requested additional time for art (43), simulators (32), platforms (13), and project design (44). Conversely, some participants indicated a preference for less time in platforms (45) and simulators (23), while only a small number wanted to reduce time in robotics (10) and art (18). This feedback will help us optimize future sessions to better align with participants' interests. Generally, they conveyed that everything related to computational thinking and robotics was something interesting to add into their classrooms *"I have some robots that I can use now"*, but they struggled to find how arts and simulators could be merged into the equation *"I struggle to think artistic things to do*

with robots in my class", "I do not think students would like simulators". However, many comments stated that the timings were suitable for the participants. *"I wouldn't change a thing about the training", "We spent as much time as needed in each part".*

Table 5.65 shows that, on average, trainees were satisfied with the division of learning modalities during training.

Table 5.65: To what extent did particular forms of learning suit the trainees (URJC)

n=111	would prefer maximally	would prefer more	satisfied	would prefer less	would prefer minimally	average
online - synchronous	16	19	58	14	4	0.26
in-person synchronous	15	27	47	11	11	0.21
asynchronous	16	12	52	16	15	-0.01

Content of training

On the one hand, the trainees were mostly satisfied with the contents of the training, they found it interesting and useful, and probably not problematic. See Table 5.66. On the other hand, trainers found it definitely innovative, useful and interesting and definitely not problematic.

Table 5.66: How trainees and trainers consider the training content (URJC)

	nt =111 nT = 3	absolutely not	probably not	hard to say	probably yes	definitely yes	average
interesting	trainees	3	4	8	51	45	1.18
	trainers					3	2
useful	trainees	3	5	14	51	38	1.05
	trainers					3	2
innovative	trainees	6	15	26	39	25	0.56
	trainers					3	2
problematic	trainees	54	22	22	9	4	-1.02
	trainers	3					-2

Trainees were asked to rate topics (computational thinking, robotics, art, simulators, platform, project design and development) of the training in terms of difficulty, where trainers rated them from the point of view of the demands on trainees. The most significant differences were in platform and simulators, where for trainees, it was adequate, but trainers thought it was more difficult for trainees. The most difficult topics for trainees were simulators (but it was still adequate), and the least difficult was the platform. Trainers found simulators to be the most difficult for trainees but mostly found everything adequate (see Table 5.67).

Table 5.67: How trainees and trainers rate training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (URJC)

	nt = 111 nT = 3	extremely difficult	difficult	adequate	easy	extremely easy	average
computational thinking	trainees	0	1	67	40	3	0.41
	trainers			3			0
robotics	trainees	0	5	74	31	1	0.25
	trainers			3			0
art	trainees	1	4	77	28	1	0.22
	trainers		1	1	1		0
simulators	trainees	0	19	71	21	0	0.02
	trainers		2	1			-0.67
platform	trainees	0	4	54	48	5	0.49
	trainers		1	2			-0.33
project design and development	trainees	1	14	71	24	1	0.09
	trainers			2	1		0.33

Artful ER projects

Trainers were mostly satisfied with Artful ER projects from trainees. The lowest score was in use of simulators (0.33) - but it was still moderate, others were good, see Table 5.68.

Table 5.68: How trainers assessed the overall quality of the submitted projects (URJC)

n =3	insufficient (-2)	poor (-1)	moderate (0)	good (1)	perfect (2)	average
computational thinking				3		1
robots involvement				3		1
arts content				3		1
use of simulators			2	1		0.33

The trainees also self-assessed their projects and how they included these topics in them. They were mostly satisfied, only with simulators they thought were adequate, other topics were well included, see Table 5.69.

Table 5.69: How trainees assessed their success in including particular topics in their Artful ER project (URJC)

n =111	not successful (-2)	poorly successful (-1)	adequately (0)	well (1)	perfectly (2)	average
computational thinking	1	0	33	50	27	0.92
use of robots	0	8	36	44	23	0.74
arts content	0	4	34	50	23	0.83
simulators	11	20	42	26	12	0.07

Trainees worked on the projects in pairs. One of the questions from the questionnaire was to assess how they worked. They mostly agreed that they liked working together on the project and that working in pairs was enriching for them. They rather disagree that it was difficult for them.

Table 5.70: How trainees assessed the work on the project in pairs (URJC)

n =111	completely disagree (-2)	rather disagree (-1)	don't know (0)	rather agree (1)	completely agree (2)	average
I liked working together on the project.	3	0	3	25	80	1.61
Working together on the project was enriching for me.	4	1	3	27	76	1.53
I didn't mind working together on the project.	11	2	18	18	62	1.03
While working together on the project, I learned something from my colleague.	4	1	1	24	81	1.59
Working together on the project was difficult.	86	14	4	4	3	-1.59

In Table 5.71 we see that most (71%) of trainees knew their project partner before the training. Most of them (96%) were satisfied with working in pairs, and most (67 %) worked on the project together.

Table 5.71: How trainees assessed the statements about the pair work on the project (URJC)

n =111	number of participants who agree	%
I worked well in a pair.	106	95.50
I would rather work alone.	2	1.80
I like working in a pair, but working with my partner did not suit me.	4	3.60
I knew my partner before this training.	79	71.17
We divided the work and each of us worked on our part independently.	7	6.31
We worked on the project together.	74	66.67
We worked separately on some parts of the project and together on other parts.	23	20.72
I worked on the greater part of the project.	7	6.31
My partner worked on the greater part of the project.	7	6.31

Satisfaction with training

Trainers assessed their satisfaction with aspects of the training, along with trainees' satisfaction perceived by them. The trainers of URJC were mostly satisfied, the lowest scores were for time allocation (1) and platform (1.33). The trainees were totally satisfied with everything based on trainers' opinion.

Table 5.72: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs (URJC)

	nT = 3	totally satisfied (2)	satisfied (1)	not satisfied, nor unsatisfied (0)	unsatisfied (-1)	totally unsatisfied (-2)	average
Training schema	trainees	3	0	0	0	0	2
	trainers	3					2
Time allocation	trainees	3	0	0	0	0	2
	trainers	1	1	1			1
Content	trainees	3	0	0	0	0	2
	trainers	3					2
Teamwork	trainers	2	1				1.67
FDM	trainers	3					2
Platform	trainers	1	2				1.33

Trainees in URJC training were satisfied with different aspects of TE. They were mostly satisfied with the expertise and willingness of lecturers (1.47 and 1.59, respectively). Time schedule got the lowest score (0.77) but is still more than average.

Table 5.73: Evaluation of different aspects of Training events by trainees (URJC)

n =111	very good (2)	good (1)	average (0)	bad (-1)	very bad (-2)	average
Expertise of lecturers	64	35	12	0	0	1.47
Willingness of lecturers	74	28	9	0	0	1.59
Premises	56	32	22	1	0	1.29
Availability of robotic equipment	37	39	29	6	0	0.96
Time schedule	30	34	40	6	1	0.77
Study materials (self-study)	40	41	29	1	0	1.08
Learning activities (synchronous learning)	36	42	29	3	1	0.98

Training Events Indicators

Table 5.74: Quantitative Indicators for the "FERTILE" Training events organised by URJC

Quantitative Indicator	Number
The number of registered trainees	117
The number of active trainees who completed the training	111
The number of dropouts	6
The number of artful projects completed and submitted by participants	60
The number of projects for ER + Music	8
The number of projects for ER + Painting	30
The number of projects for ER + Drama	6
The number of projects for ER + others	16
The number of primary schools involved.	10
The number of secondary schools involved.	7
The number of universities involved.	1

Table 5.75: Qualitative Indicators for FERTILE Training events (URJC)

Qualitative Indicator	Indicative quote
Assessment of event organisation	"I believe the organization was perfect" "The sequence of the topics was useful" "Guidance was everything I needed and it was provided accordingly"
Assessment of accessibility of training content	"All the materials were accessible" "Not only we had slides, but also videos with many examples"
The participants' interaction with colleagues	"It is really useful to be able to share" "Collaboration is fundamental"
The participants' interaction with instructors	"The instructors were really helpful" "Sometimes our group got stuck and the instructor helped us" "We were given some ideas that did not come across our mind"
The participants' overall satisfaction with the learning experience	"Having a methodology that does not require a specific tool to be used is really handy"
Overall satisfaction of instructors with the course of training	"After the pilot study I believe the training was highly improved" "When the participants collaborate, the training runs better"

4.4.5 UVa

Trainers

The training was led by three trainers, each contributing to its success with different amounts of time and effort. One trainer prepared their sessions in less than 1.5 hours, while the other two spent over 3 hours each on preparation. On average, the trainers rated the effort required to prepare the lectures as moderate, scoring 3 on a scale of 1 (minimal effort) to 5 (significant effort). In terms of the percentage of training materials covered during the practical sessions (MEs), the trainers' approaches varied: one trainer completed around 50% of the materials. In contrast, the others reached higher completion levels. Feedback on the new arrangement of topics, particularly from those involved in the pilot training, was generally positive, with an average rating close to 1, suggesting that it was viewed as slightly to moderately better than the previous schema. These insights reveal the trainers' diverse approaches and perspectives, underscoring their flexibility and dedication to effectively delivering the training.

Table 5.76: How much time did it take UVa trainers to:

n=3	less than 1,5 hours	1,5 - 3 hours	more than 3 hours
to prepare for lectures on average	1	1	1
to check the students' HW after each meeting	3		

Trainees

Table 5.77: To which training topics would trainees allocate more/less time (UVa)

n = 20	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	7	9	7	5	4	5	2
less time	0	5	4	6	5	2	1

Qualitative Data Analysis

Participants highlighted the need for more time to understand robotics, mainly programming simulators for beginners. Many emphasised the importance of computational thinking and its application in early childhood education. Some mentioned challenges in using robotics in daily practice and suggested dedicating more time to project design and development. There were also requests for a more profound introduction to robotics, block programming, and practical examples. Additionally, the participants noted the connection between Education Robotics and Arts as an area for further exploration.

Some participants felt that the training was too short and that certain areas, such as robotics sessions, were given excessive time. They found the topics related to the platform intuitive, and they preferred to focus more on other topics. Some participants found robotics less relevant to their needs, especially in early childhood education, and suggested reducing its time allocation. Additionally, there was a

preference for more practical activities rather than just videos. However, many agreed that the training covered the necessary foundations effectively.

Table 5.78 shows that, on average, trainees were satisfied with the division of learning modality during training. They would prefer slightly less in-person synchronous learning.

Table 5.78: To what extent did particular forms of learning suit the trainees (UVa)

n=20	would prefer maximally (2)	would prefer more (1)	satisfied (0)	would prefer less (-1)	would prefer minimally (-2)	average
online - synchronous	3	3	10	2	2	0.15
in-person synchronous	2	3	7	2	6	-0.35
asynchronous	4	3	8	1	4	0.1

Content of training

On the one hand, trainees were mostly satisfied with the contents of the training. They found it probably interesting and innovative and probably not problematic. See Table 5.79. On the other hand, trainers found it definitely interesting, useful, innovative, and absolutely not problematic.

Table 5.79: How trainees and trainers consider the training content (UVa)

	nt =20 nT = 3	absolutely not	probably not	hard to say	probably yes	definitely yes	average
interesting	trainees	1	0	1	8	10	1.3
	trainers					3	2
useful	trainees	1	0	3	6	10	1.2
	trainers					3	2
innovative	trainees	3	1	3	5	8	0.7
	trainers					3	2
problematic	trainees	9	8	2	0	1	-1.2
	trainers	3					-2

Trainees were asked to rate topics (computational thinking, robotics, art, simulators, platform, project design and development) of the training in terms of difficulty, where trainers rated them from the point of view of the demands on trainees. The most significant differences were about the platform, even though both values are more or less adequate. The most difficult topics for trainees were simulators, the least difficult was platform. Trainers found the platform to be the most difficult for trainees, and the slightly least difficult they found project design. On average, trainers found all topics to be adequate. See Table 5.80.

Table 5.80: How trainees and trainers rate training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (UVa)

	nt = 20 nT = 3	extremely difficult	difficult	adequate	easy	extremely easy	average
computational thinking	trainees	0	2	16	2	0	0
	trainers			3			0
robotics	trainees	0	6	12	2	0	-0.2
	trainers			3			0
art	trainees	0	0	15	4	1	0.3
	trainers		1	1	1		0
simulators	trainees	1	7	10	2	0	-0.35
	trainers		2	1			-0.67
platform	trainees	0	0	12	6	2	0.5
	trainers		1	2			-0.33
project design and development	trainees	0	2	16	2	0	0
	trainers			2	1		0.33

Artful ER projects

The trainers were mostly satisfied with the Artful ER projects designed by the trainees. They were slightly less satisfied with the use of simulators - but it was still moderate, see Table 5.81.

Table 5.81: How trainers assessed the overall quality of the submitted projects (UVa)

n =3	insufficient (-2)	poor (-1)	moderate (0)	good (1)	perfect (2)	average
computational thinking				3		1
robots involvement				3		1
arts content			1	2		0.67
use of simulators			2	1		0.33

Trainees also assessed their projects and how they included these topics in them. They were mostly satisfied with computational thinking and the least satisfied with simulators, see Table 5.82.

Table 5.82: How trainees assessed their success in including particular topics in their Artful ER project (UVa)

n =20	not successful (-2)	poorly successful (-1)	adequately (0)	well (1)	perfectly (2)	average
computational thinking	0	1	9	6	4	0.65
use of robots	1	1	8	8	2	0.45
arts content	1	0	10	7	2	0.45
simulators	1	3	8	8	0	0.15

Trainees worked on the projects in pairs. One of the questions from the questionnaire was to assess how they worked. They neither agreed nor disagreed with most of the statements. They somewhat disagree that it was difficult for them.

Table 5.83: How trainees assessed the work on the project in pairs (UVa)

n =20	completely disagree (-2)	rather disagree (-1)	don't know (0)	rather agree (1)	completely agree (2)	average
I liked working together on the project.	2	0	7	6	5	0.6
Working together on the project was enriching for me.	2	1	6	6	3	0.39
I didn't mind working together on the project.	2	0	8	7	3	0.45
While working together on the project, I learned something from my colleague.	2	1	6	6	5	0.55
Working together on the project was difficult.	7	7	5	1	0	-1.0

In Table 5.84 we see that only 20% of trainees knew their project partner prior to the training. More of them (7 to 5) would rather work alone.

Table 5.84: How trainees assessed the statements about the pair work on the project (UVa)

n =20	number of participants who agree	%
I worked well in a pair.	5	25%
I would rather work alone.	7	35%
I like working in a pair, but working with my partner did not suit me.	0	0%
I knew my partner before this training.	4	20%
We divided the work, and each of us worked on our part independently.	0	0%
We worked on the project together.	4	20%
We worked separately on some parts of the project and together on other parts.	3	15%

I worked on the greater part of the project.	3	15%
My partner worked on the greater part of the project.	0	0%

Satisfaction with training

Trainers assessed their satisfaction with aspects of the training, along with trainees' satisfaction as they perceived it. Trainers from UVa were mostly satisfied. The lowest score was in time allocation (1). The lowest score for trainees' satisfaction was in time allocation (1.33).

Table 5.85: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs (UVa)

	nT = 3	totally satisfied (2)	satisfied (1)	not satisfied, nor unsatisfied (0)	unsatisfied (-1)	totally unsatisfied (-2)	average
Training schema	trainees	3					2
	trainers	3					2
Time allocation	trainees	1	2				1.33
	trainers	1	1	1			1
Content	trainees	3					2
	trainers	3					2
Teamwork	trainers	2	1				1.67
FDM	trainers	3					2
Platform	trainers	1	2				1.33

Trainees in UVa training were satisfied with different aspects of TE. They were mostly satisfied with the willingness of lecturers (1.85). Availability of robotic equipment got the lowest score (0.85), but it is still more than average.

Table 5.86: Evaluation of different aspects of Training events by trainees (UVa)

n =20	very good (2)	good (1)	average (0)	bad (-1)	very bad (-2)	average
Expertise of lecturers	15	5	0	0	0	1.75
Willingness of lecturers	17	3	0	0	0	1.85
Premises	8	5	7	0	0	1.05
Availability of robotic equipment	9	3	5	2	1	0.85
Time schedule	14	2	3	0	1	1.4
Study materials (self-study)	12	5	3	0	0	1.45
Learning activities (synchronous learning)	12	5	3	0	0	1.45

Training Events Indicators

Table 5.87: Quantitative Indicators for the "FERTILE" Training events organised by UVa

Quantitative Indicator	Number
The number of registered trainees	57
The number of active trainees who completed the training	20
The number of dropouts	16
The number of artful projects completed and submitted by participants	18*
The number of projects for ER + Music	2
The number of projects for ER + Painting	6
The number of projects for ER + Drama	3
The number of projects for ER + others	9
The number of primary schools involved.	6
The number of secondary schools involved.	5
The number of universities involved.	1

*As a number of projects combined robotics with several other art forms, the sum of the projects in each category is greater than the total number of projects.

Table 5.88: Qualitative Indicators for FERTILE Training events (UVa)

Qualitative Indicator	Description/quote
Assessment of event organisation	"Organization was clear. Locations, robots and activities were adequately prepared"
Assessment of accessibility of training content	"Being able to access the materials at home was quite handy in order to finish developing the project"
The participants' interaction with colleagues	"Several people can provide different ideas that can enrich the Artful ER project"
The participants' interaction with instructors	"Trainers were really helpful when our group got stuck"
The participants' overall satisfaction with the learning experience	"I would have loved to play with more robots" "I wanted the training to last longer"
Overall satisfaction of instructors with the course of training	"Participants were really participative, which helped a lot"

5. KEY FINDINGS

This section shows data from all four participating partners, and the differences and similarities are outlined. We focused on the most critical issues addressed in the trainers' and trainees' questionnaires.

Data in Table 6.1 shows that trainees were satisfied with the time spent on different modalities - online, face-to-face and asynchronous. All values are around 0 (*this extent suits me*), indicating that the learning modalities' application was efficient.

Table 6.1: To what extent did particular learning modalities suit the trainees (all training events)

(would prefer maximally 2, would prefer minimally -2)	CUB n = 41	CUP n = 8	UniWa n = 37	URJC n = 111	UVA n = 20	average n = 217
online - synchronous	0.1	-0,63	0.11	0.26	0.15	**0,16**
in-person synchronous	0.29	0,38	0.51	0.21	-0.35	**0,23**
asynchronous	-0.05	-0,25	-0.24	-0.01	0.1	**-0,05**

Table 6.2: To which training topics would trainees allocate more/less time (all training events)

n = 217	CT	Robotics	Art	Simulators	Platform	Project design and development	other
more time	**106**	**138**	67	**80**	27	78	3
less time	32	23	42	42	**79**	23	13

The trainees were asked which topics they would allocate more or less time to. In Table 6.2, we can see that most of them (138 out of 217 responses, 63,5%) would like more time for robotics. And almost half of them (106) would like more time for the topic of computational thinking. In open-ended questions in the questionnaire, many trainees described why they would like to allocate more time to these topics. There were different reasons behind the robotics topic. For some trainees, it was a *novel topic,* and they *lacked expertise in it*. For others, it was *interesting*. Some wanted to *familiarise themself with different robots and robotic kits.*

The second most wanted topic was computational thinking. It should be noted that there were differences between countries - in URJC, computational thinking was chosen by 68 trainees, almost as many of them as robotics (71). In UniWa and CUB, the difference between robotics and computational thinking was more considerable (6 for UniWa, nt=37; and 20 for CUB, nt = 41). The trainees' different backgrounds could explain this difference. In the training event organised by URJC, only 32 out of 111 trainees taught computer science/informatics, and 50 trainees taught other subjects, while in CUB, 36 out of 41 trainees taught CS/informatics. This topic could have been novel for those who did not teach CS/informatics. Indicatively, the participants of the training event organised by URJC reported that computational thinking was something *interesting* to integrate into their teaching practice.

The third most wanted topic was about Simulators which were chosen from 80 out of 217 responses (38%). Again, many trainees did not have prior experience with simulators, so they wanted to *gain more knowledge and skills* in working with them. Some had *personal preferences* on this topic.

Although the platform was the most chosen topic for allocating less time, the responses were lower than those requesting to allocate more time. Many trainees stated that the time allocation was reasonable, and they did not think something needed to be shortened. The reasons behind allocating less time for the platform were due to its *intuitiveness* and the *good coverage* of its use *in videos.*

Art and Simulators were chosen from 42 participants, with some participants stating that they did not find it *useful* for their students, and thought *students would not like* working with simulators.

Table 6.3: How trainees and trainers consider the training content (all training events)

		CUB nt = 41 nT = 4	CUP nt = 8 nT = 2	UniWa nt = 37 nT = 5	URJC nt = 111 nT = 3	UVA nt = 20 nT = 3	average nt = 217 nT = 17
interesting	trainees	1.71	1.38	1.92	1.18	1.3	1.42
	trainers	1.75	2	2	2	2	1.94
useful	trainees	1.54	1	1.92	1.05	1.2	1.30
	trainers	2	2	2	2	2	2.00
innovative	trainees	1.71	1	1.78	0.56	0.7	1.01
	trainers	1	1	1.2	2	2	1.47
problematic	trainees	-0.71	0	-1.59	-1.02	-1.2	-1.04
	trainers	0	0	-2	-2	-2	-1.29

Requesting feedback on how the trainers and trainees perceived the training events, we asked whether the training was *interesting* for them, *useful*, *innovative* and *problematic*. We present the findings in Table 6.3. On a scale from -2 (absolutely not) to 2 (definitely yes), the favorable results were for usefulness (2 from trainers) and interest (1.94 from trainers). All values are more than 1 (less than -1 in problematic), which indicates that all participants (trainers and trainees) were mostly satisfied.

The trainers and trainees both rated different aspects of the training regarding their *difficulty*. The trainers, from the point of view of the demands on trainees' behalf. The findings reported in Table 6.4 reveal that the training topics were adequate. These findings indicate meeting the needs of trainees and having appropriate difficulty for them. The biggest differences between the ratings of trainers and trainees were observed about the topics of simulators (-0.65 from trainers to 0.1 from trainees) and the platform (-0.18 from trainers to 0,53 from trainees). In both cases, trainers rated it as more demanding for trainees. There were the exact differences between all partners - this could mean that trainers viewed these topics as more demanding, and they found the trainees would struggle with them. However, a positive note was the controversy of findings showing that the trainees themselves did not perceive them as difficult overall.

Table 6.4: How trainees and trainers rate training topics in terms of difficulty (trainers from the point of view of the demands on trainees) (all training events)

(5 point scale from -2 extremely difficult, to 2 extremely easy)		CUB nt = 41 nT = 4	CUP nt = 8 nT = 2	UniWa nt = 37 nT = 5	URJC nt = 111 nT = 3	UVA nt = 20 nT = 3	average nt = 217 nT = 17
computational thinking	trainees	-0,12	0,00	0,70	0.41	0,00	**0,3**
	trainers	-0,75	-0,50	0,00	0	0,00	**-0,24**
robotics	trainees	-0,02	0,38	0,78	0.25	-0,20	**0,25**
	trainers	0,25	0,50	0,40	0	0,00	**0,24**
Art	trainees	-0,02	0,00	0,76	0.22	0,30	**0,26**
	trainers	0,25	0,50	0,80	0	0,00	**0,35**
simulators	trainees	0,00	0,38	0,62	0.02	-0,35	**0,1**
	trainers	-0,75	-1,00	-0,40	-0.67	-0,67	**-0,65**
platform	trainees	0,20	0,13	1,11	0.49	0,50	**0,53**
	trainers	-1,25	0,00	0,80	-0.33	-0,33	**-0,18**
project design and development	trainees	-0,54	-0,88	0,51	0.09	0,00	**0**
	trainers	-1,00	0,00	-0,20	0.33	0,33	**-0,18**

Table 6.5 shows the trainers' assessment of the Artful Er projects developed by trainees during the training events. The findings show a good assessment of integrating Computational thinking, Robotics and Arts into these projects on average. The integration of simulators had the lowest evaluation quality, but it was still moderate (0.1). Only the training events organised by CUP using simulators seem to be poorly included by trainees in their projects (-1.0). The results about simulators could be connected to the findings deriving from Table 6.4. The lower quality of simulators' use in projects compared to other topics could lead trainers to perceive this topic as more demanding/difficult for trainees.

Table 6.5: How trainers assessed the overall quality of the submitted projects (insufficient -2, poor -1, moderate 0, good 1, perfect 2) (all training events)

	CUB nT = 4	CUP nT = 2	UniWa nT = 5	URJC nT = 3	UVA nT = 3	average n = 21
computational thinking	1	0.50	1.60	1.00	1.00	**1.1**
robots involvement	1.25	1.00	1.40	1.00	1.00	**1.1**
arts content	0.75	1.00	1.80	1.00	0.67	**1.1**
use of simulators	0	-1.00	0.80	0.33	0.33	**0.1**

The trainees self-assessed lower their success in including particular topics in their Artful ER project than trainers did, data are shown in Table 6.6. The least successful topic was the same as in trainers opinion - use of simulators. Still, trainees saw it as adequately included in their project, and other topics were more well included. Data from Table 6.5 and Table 6.6 suggest that the overall quality of projects was adequate. Only negative numbers are visible in the training organised by CUP - where trainers rated use of simulators in trainees' projects as poor, and trainees rated it similarly (-0.75). In the training organised by UniWA, the trainers' assessment for topics except simulators were closer to 2 (perfect). These findings suggest that trainees were adequately trained to develop Artful ER projects.

Table 6.6: How trainees assessed their success in including particular topics in their Artful ER project (not successful -2, poorly successful -1, adequately 0, well 1, perfectly 2) (all training events)

	CUB nt = 41	CUP nt = 8	UniWa nt = 37	URJC nt = 111	UVA nt = 20	average n = 217
computational thinking	0.85	0.50	1.05	0.92	0.65	**0.89**
robots involvement	1.00	-0.13	1.00	0.74	0.45	**0.77**
arts content	0.93	0.13	1.05	0.83	0.45	**0.82**
use of simulators	0.61	-0.75	0.22	0.07	0.15	**0.18**

Trainers were mostly satisfied with different aspects of training, mostly with training schema and content. From their point of view, trainees were most satisfied with the content. Notably, the lowest score was for the platform. This finding is mainly attributed to trainers of CUB who were not satisfied with it (-0.75), while trainers from the other partner organisations have relatively higher evaluations. Such findings require further investigation into the factors influencing such an evaluation.

Table 6.7: Satisfaction of the trainers and trainees (assessed by trainers) with aspects of the TEs

	nT =	CUB nT = 4	CUP nT = 2	UniWa nT = 5	URJC nT = 3	UVA nT = 3	average
Training schema	trainees	0.75	1.00	1.6	2	2	1.47
	trainers	1.5	1	2	2	2	1.76
Time allocation	trainees	0.25	0.5	1.4	2	2	1.24
	trainers	1.5	0.5	1.6	1	1	1.24
Content	trainees	1	1.5	1.6	2	2	1.59
	trainers	1	1,5	2	2	2	1.71
Teamwork	trainers	1.25	2	1.8	1.67	1.67	1.65
FDM	trainers	1	0.5	1.8	2	2	1.53
Platform	trainers	-0.75	0.5	1.6	1.33	1.33	0.82

In summary, there were 316 registered trainees, 252 trainees completed the training and 15 dropped out during the training. Regarding the educational levels the trainees originated from, they came from 65 primary and kindergarten schools, 52 (lower and upper) secondary schools and 4 universities (other than the universities that were partner organisations in the "FERTILE" project).

The trainees developed 129 Artful ER projects. Regarding the Art forms involved, most of these projects (54) involved painting and the rest involved literature, dancing or cinema.

Table 6.8: Quantitative indicators of FERTILE Training events

Quantitative Indicator	Number/Description
The number of registered trainees	53+40+49+117+57 = **316**
The number of active trainees who completed the training	41+31+49+111+20 = **252**
The number of dropouts	0+9+0+6+0 = **15**
The number of artful projects completed and submitted by participants	21+8+20+60+20 = **129**
The number of projects for ER + Music	6+1+5+8+2 = **22**
The number of projects for ER + Painting	10+6+2+30+6 = **54**
The number of projects for ER + Drama	1+2+5+6+3 = **17**
The number of projects for ER + Literature	1+0+1+0+0 = **2**
The number of projects for ER + Cinema	0+0+1+0+0 = **1**
The number of projects for ER + Dancing	2+0+0+0+0 = **2**
The number of projects for ER + Arts and Crafts	3+0+5+0+0 = **8**
The number of projects for ER + others	4+0+1+16+9 = **30**
The number of primary schools involved.	20+10+19+10+6 = **65**
The number of secondary schools involved.	16+6+18+7+5 = **52**
The number of universities involved.	0+0+2+1+1 = **4**

In addition to the above outputs, we also obtained interesting results from the community analytics provided by the "FERTILE" Community platform. These results illustrate the level of use of the community platform, the number of users, classrooms, forum threads and posts, the number and type of projects created, their distribution by Educational level, language, the way Arts is involved, etc. However, it should be noted that the data from which the analyses are generated are not only related to training events, but to the overall use of the platform, including its use in the pilot testing. The community analytics form an appendix to this report.

6. Conclusions

The training events are one of the main results of the FERTILE project. All project partner organisations have organised training events. A total of 298 Greek, Spanish, Czech and Slovak trainees participated in the "FERTILE" training across all events. They were in-service and pre-service educators originating from all education levels, from kindergarten to university.

As part of the previous project results, study materials were created focusing on the basic topics of the project and covering 4 training modules: “Robotics as an educational tool for cultivating CT”, “Interweaving ER with Arts”, “Blending F2F with online experience through exemplar artful ER projects” and “The FERTILE Design Methodology through co-designing artful ER projects”. A tentative training schema of training events utilising this material was designed. It determined a sequence of topics, their modality (face-to-face sessions, synchronous online sessions, and asynchronous learning) and time allocation, a sequence of activities per topic and the learning materials used. This tentative training schema was tested in pilot studies conducted by project partners and was adjusted based on the feedback collected by the participants in those pilot studies.

Subsequently, the “FERTILE” consortium synthesised a training schema of a “FERTILE” Training event (see the 2nd section), and each partner organised training events based on it. The findings of the training events conducted provide insights into several aspects of the “FERTILE” training organisation. The participants were generally satisfied with the training schema, its activities, materials, and the learning modalities offered during the different phases of the training. Therefore, we recommend following this training schema to organise a “FERTILE” training in the future. Notably, several variations implemented by the “FERTILE” consortium, which we present in the 3rd section of this report, reveal that trainers may adapt the learning modalities and/or activities of the “FERTILE” training to fit any particular trainees’ needs.

The data analysis further revealed that the training content and materials were deemed appropriate for teachers of all educational levels. Only a few trainees indicated that they would describe the training as problematic. The vast majority of them found the training interesting, useful, and innovative. In terms of difficulty, the participants found the individual training topics to be appropriate. However, several trainees expressed interest in having more time devoted to particular topics such as educational robotics, computational thinking, and simulators, justifying their request mainly because it was a novel topic for them and they lacked expertise in it. In the future, it is therefore worth considering extending the total training time and adding more activities about topics depending on the composition of the trainee group. For example, Art teachers required more activities on the topic of computational thinking, while almost all teachers requested more activities with robots.

The strength of the “FERTILE” training, which the trainees highly appreciated, was the well-prepared study materials and activities. Focusing on activities, they valued the joint work on co-designing an interdisciplinary project based on the “FERTILE” methodology. The Artful ER project the trainees completed in pairs involved the interdisciplinary collaboration of a computer science/educational robotics teacher and an art teacher. The trainees acknowledged the need for a synergetic combination of their discipline-oriented viewpoints in this collaboration. Using the “FERTILE” design methodology supported them in dealing with their different intentions for students’ learning outcomes and considering CT skills as the primary outcome of interdisciplinary learning.

Several quantitative indicators provide evidence of the success of these training events. These indicators include the large number of registered participants, the low dropout rate, the large number of Artful ER projects designed, and the trainers' good evaluation.

Furthermore, a welcome implication of the “FERTILE” training was that several trainees liked the idea of this type of project so much that they reported their intention to implement the Artful ER projects with their students shortly after the training.

Another compelling implication is that some project partners have collaborated with institutions involved in the lifelong learning of teachers to organise the training. Such a strategy was excellent for recruiting trainees and, most importantly, disseminating the “FERTILE” initiative in their local, regional and national educational communities.

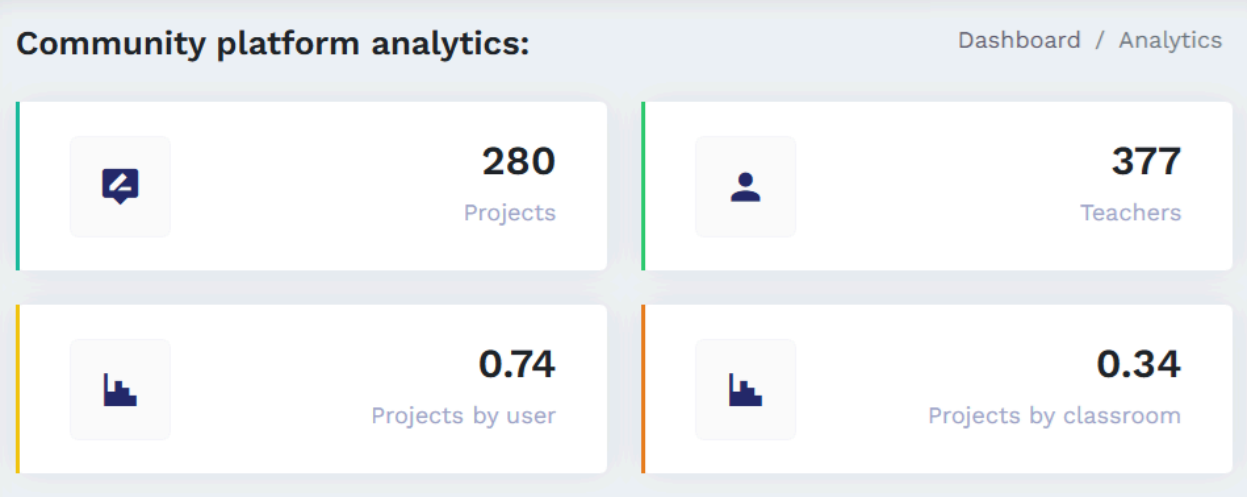
The output from training, which the teachers welcomed, was certificates of participation or successful completion (if they completed the training with a successful project proposal and presentation). Such certificates are welcomed as proof of teachers’ professional development. In some cases, such certificates may help teachers get a higher rating at their school or be recognised as innovative teachers in developing Artful ER projects for students.

Overall, we claim that the “FERTILE” training events spread the “FERTILE” initiative to the participants, who will act as multipliers to their colleagues and promote the interdisciplinary approach to developing Artful ER projects promoting their students’ computational thinking skills.

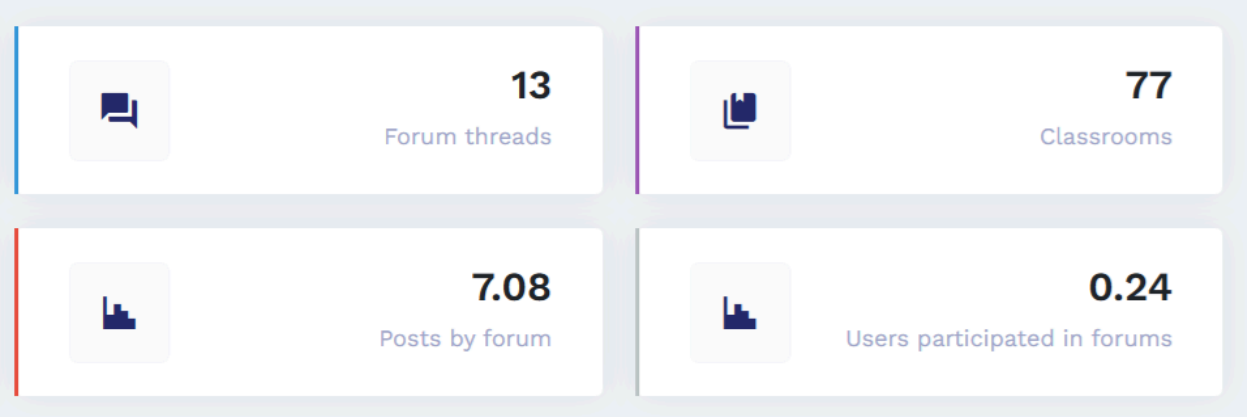
APPENDIX

Community Platform Analytics

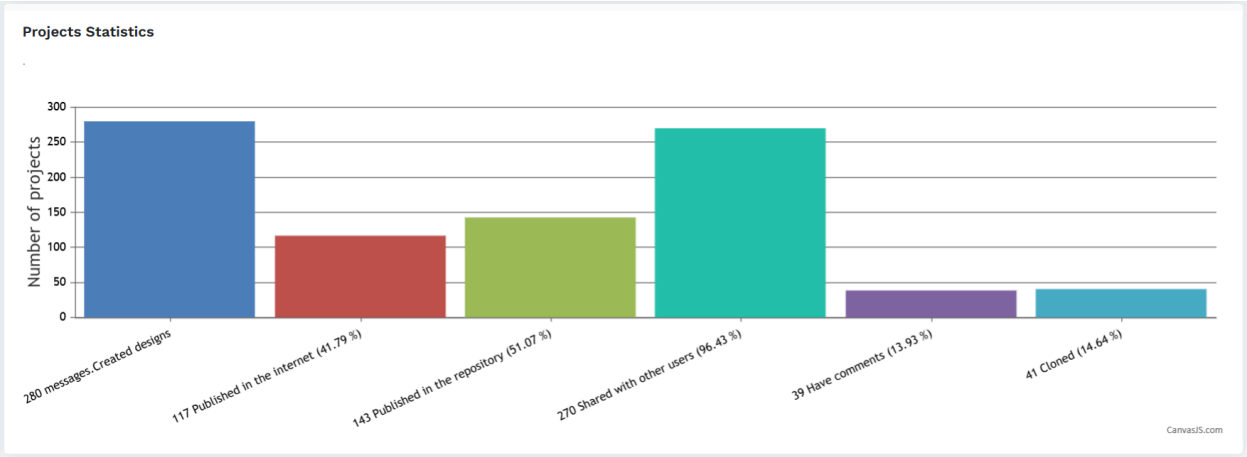
In this appendix, we present the results obtained from the community analytics provided by the FERTILE community platform. These results illustrate the level of use of the community platform, the number of users, classes, threads and forum posts, the number and type of projects created, their distribution according to Educational level, language, way of engaging with the arts, etc. However, the data from which the analytics are generated are related to the overall use of the platform, for example, including its use during the pilot testing. Therefore, these analytics do not directly form part of the evaluation of FERTILE main training events but are presented for illustrative purposes.



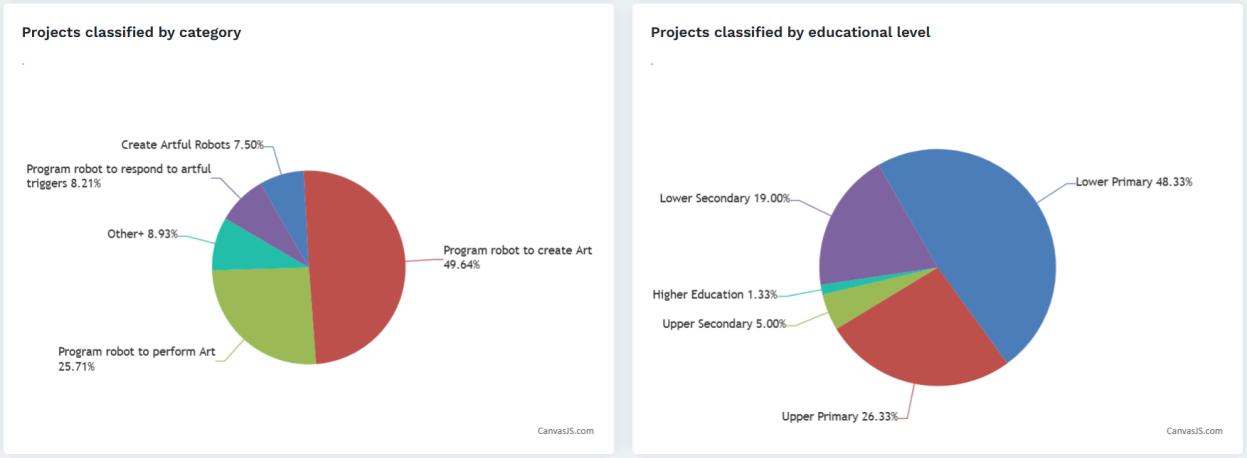
Picture 1: a) Number of projects created in FERTILE Community Platform; b) Number of teachers - users of FERTILE Community Platform; c) Average number of projects created by user; d) Average number of projects created by classroom



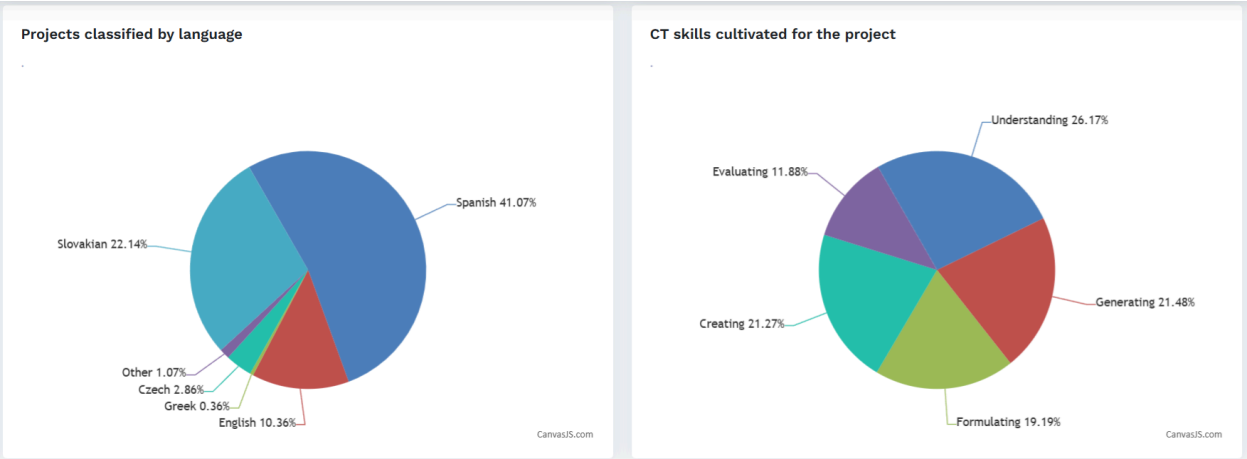
Picture 2: a) Number of forum threads created in FERTILE Community Platform; b) Number of classrooms created in FERTILE Community Platform; c) Average number of posts published by user; d) Average number of users participated in forums



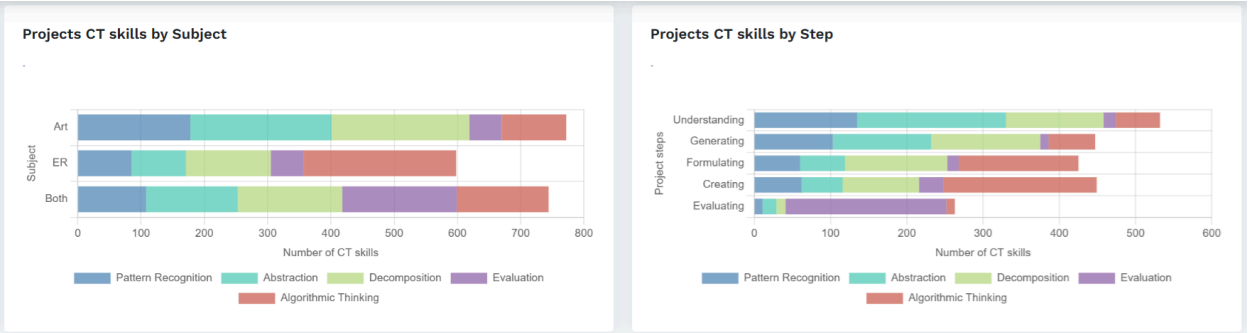
Picture 3: Project Statistics



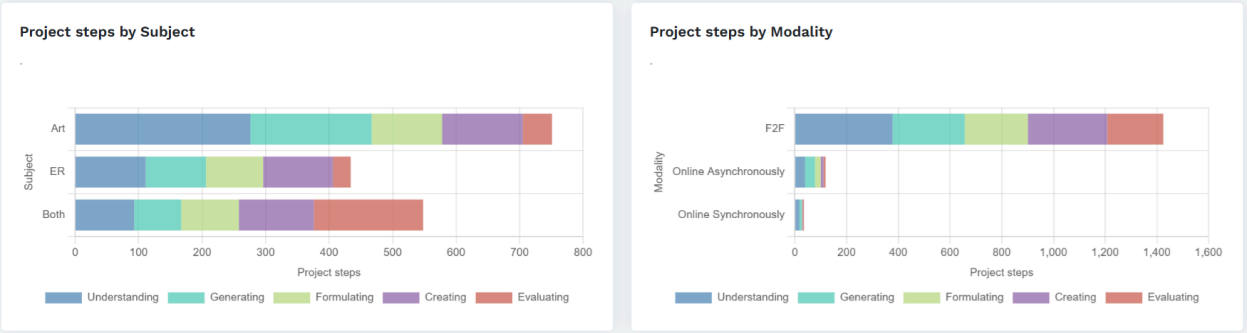
Picture 4: Project shares a) by category; b) by educational level



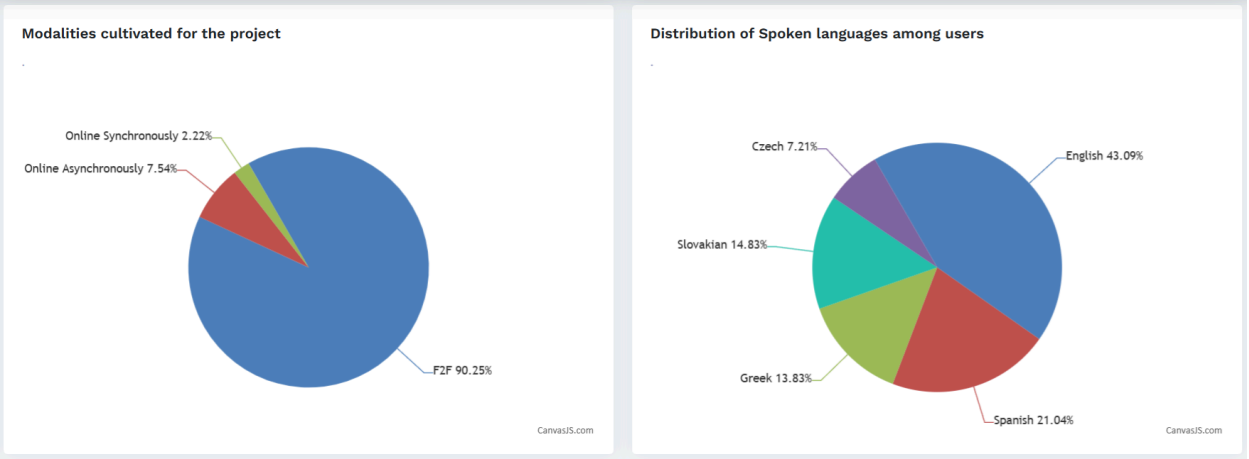
Picture 5: a) Projects share by language; b) CT skills cultivated for the project



Picture 6: Projects CT skills a) by subject; b) by step



Picture 7: Projects steps a) by subject; b) by modality



Picture 8: a) Modalities cultivated for the project; b) Distribution of spoken languages among users