Think4Jobs
Critical Thinking for Successful Jobs

THINK4JOBS TRAINING

Critical Thinking Training Packages for Higher Education Instructors and Labour Market Tutors

THINK4JOBS

TRAINING

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Authors

1. Pnevmatikos Dimitrios, University of Western Macedonia (UOWM)
2. Christodoulou Panagiota, University of Western Macedonia (UOWM)
3. Georgiadou Triantafyllia, University of Western Macedonia (UOWM)
4. Lithoxoidou Angeliki, University of Western Macedonia (UOWM)
5. Dimitriadou Aikaterini, University of Western Macedonia (UOWM)
6. Payan Carreira Rita, University of Èvora (UÉvora)
7. Simões Margarida, University of Èvora (UÉvora)
8. Ferreira David, University of Èvora (UÉvora)
9. Rebelo Hugo, University of Èvora (UÉvora)
10. Sebastião Luis, University of Èvora (UÉvora)
11. Antunes Célia, University of Èvora (UÉvora)
12. Dumitru Daniela, Bucharest University of Economics Studies (ASE)
13. Lăcătuş Maria Liana, Bucharest University of Economics Studies (ASE)
14. Stăiculescu Camelia, Bucharest University of Economics Studies (ASE)
15. Paduraru Monica Elisabeta, Bucharest University of Economics Studies (ASE)
16. Arcimavičienė Liudmila, Vilnius University (VU)
17. Poštič Svetozar, Vilnius University (VU)
18. Ivancu Ovidiu, Vilnius University (VU)
19. Kriaučiūnienė Roma, Vilnius University (VU)
20. Vaidakavičiūtė Agnė, Vilnius University (VU)
21. Mäkiö Juho, University of Applied Sciences Emden-Leer (HSEL)
22. Mäkiö Elena, University of Applied Sciences Emden-Leer (HSEL)
23. Maioru Monica, BRD Groupe Société Générale (BRD)
24. Paun Diana, BRD Groupe Société Générale (BRD)
25. Kappatou Anastasia, Elementary Experimental School of Florina
26. Sechidis Kostantinos, Elementary Experimental School of Florina

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27. Amarantidou Kiriaki, Elementary Experimental School of Florina
28. Arvanitakis Ioannis, Elementary Experimental School of Florina
29. Doukas Dimitrios, Elementary Experimental School of Florina
30. Antonogianni Vasiliki, Elementary Experimental School of Florina
31. Auškelienė Audronė, Public Service Language Center (VIKC)
32. Rudienė Asterija, Public Service Language Center (VIKC)
33. Samukienė Rita, Public Service Language Center (VIKC)
34. Silva Ruben, Hospital Veterinário Atlântico (HVA)
35. Albano Carla, Hospital Veterinário Atlântico (HVA)
36. Sofia D'orey, Hospital Veterinário Atlântico (HVA)
37. Margarida Maximo, Hospital Veterinário Atlântico (HVA)
38. Miranda Sonia, Hospital Veterinário Atlântico (HVA)
39. Busker Wolfgang, Orgadata AG (Orgadata)
40. Meinders Andreas, Orgadata AG (Orgadata)

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Executive summary and key findings

This Report presents the findings of the "Critical Thinking for Successful Jobs-Think4Jobs" Partnership regarding the development of Critical Thinking Training Packages for Higher Education Instructors and Labour Market Organisations Tutors, namely Intellectual Output II.

Considering previous research findings, it is suggested that despite HE and LMO instructors' willingness to promote CT, they both might lack conceptual as well as procedural knowledge regarding CT. In order to assume that a common understanding between HE and LMOs can be achieved to promote CT skills development effectively in future graduates, the aim of this project was to develop a training course for HE instructors as well as LMO tutors. More specifically, the project aims to strengthen University-Business Collaboration for the effective promotion, development, support and assessment of students' CT through their transition into a professional context using apprenticeships as a privileged interface in order to "bridge the gap" between their skills and those needed by the labour market. The specific objective of the second Intellectual Output was to develop a training curriculum for Higher Education Instructors and Labour Market Organisations Tutors on how to promote, develop, support and assess students' CT in apprenticeships curricula as well as on how to develop blended curricula using Moodle. The training aimed at reaching 30 participants from the Partnership (i.e., 15 from Higher Education and 15 from Labour Market Organisations).

To reach the aforementioned objective for the delivery of the Output, five activities were originally designed:

1. Define the goals, outcomes and assessment criteria of the training packages.

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2. Identify the training subjects and design the activities to be held.
3. Identify, select and/or create training resources, which will support the activities during the training packages.
4. Develop a transnational training course
5. Delivery of the training course.

University of Western Macedonia (UOWM) was the leading Organisation for the delivery of the second Intellectual Output. A Participatory Co-Design (PC-D Methodology was implemented to map the participants' requirements and needs for the training. For the implementation of the training course, participants from both the Higher Education and the Labor Market Organisations from the five countries partake as Trainers providing various workshops focusing on experiential learning. More specifically, workshops concerned the deconstruction and reconstruction of previously held ideas regarding CT, the development of a working definition on CT for the Think4Jobs project, instructional approaches and teaching strategies that promote CT, blended learning and Moodle, the assessment of CT as well as the preparation of the Memorandum of Understanding (MoU) between HE and LMOs. Finally, a reflective session on the work carried out for the MoU and a session for the design and development of the CT blended apprenticeship curricula were scheduled. According to the registrations, on a daily basis, 35 participants engaged in the LTTA.

Participants' knowledge on conceptual and procedural knowledge regarding CT, evaluation of CT, as well as blended learning, University-Business Collaboration and Moodle were evaluated in a pre-post measurement. In order to assess participants' previous knowledge as well as the knowledge acquired during the LTTA, two online questionnaires were used. The first questionnaire (pre-measurement) was administered to participants at the beginning of the training course, while the second questionnaire (post-measurement) at the end of the LTTA (122 items for the pre-test,

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130 items for the post-test, including questions about participants' commitment during LTTA and their evaluation of the LTTA). The data collection tool consisted of seven distinct parts. The first part concerned demographic information, while the second part assessed participants' level of perceived self-confidence in the issues addressed in the LTTA, the Moodle's ease of use and perceived self-efficacy. Parts three to five of the tool explored participants' conceptions regarding myths and facts about conceptual and procedural knowledge of CT, the evaluation of CT, blended learning and the University and Business Collaboration. Moreover, participants' level of confidence about their answers was also assessed.

Statistical analysis of data collected suggested that participants' knowledge about CT, blended learning and the University and Business Collaboration increased after their participation in the LTTA. However, these results were not statistically significant. A statistically significant median increase elicited only in participants' perceived self-confidence on the topics addressed during the LTTA, only for HE participants. Finally, the administrative and management of the implemented LTTA was evaluated highlighting that the event reached the predefined objectives and goals, met participants' expectations and offered a high quality learning and training experience to the participants.

Apart from the measurable data, a significant outcome of the LTTA was the development of a Memorandum of Understanding (MoU) between each pair of HEIs and LMOs partner per country. The MoU set a specific framework on the expected collaboration between HE and LMOs for the design-development (IO3), implementation and evaluation (IO4) of the CT blended apprenticeships curricula. The development of MoUs suggest that a common understanding on the design and delivery of CT blended apprenticeships curricula has been achieved and that UBC has been tailored to each pair of contributors.

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Overall, the CT training course presented in the current report has contributed to the existing research and literature in numerous ways. First, it presented a course designed to address the specific needs of its participants, by employing a PC-D approach. Second, it presented a training course that can also be applied in the future, as an intensive program aiming to enhance CT in educational and LMO settings. Third, it actively engaged HE Instructors and LMOs in a common training course, trying to reach a common understanding. Finally, the current report contributes to the literature with the exploitation of a multiple-choice instrument incorporating a Certainty Response Index identifying not only participants' alternative concepts but also their level of confidence on aspects of CT, blended learning and UBC.

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General Introduction

Critical Thinking (CT) is among the key skills for the complex and globalized societies of the 21st century. There is a growing consensus that Higher Education (HE) should cultivate CT with their students to nurture, on the one hand, decision makers able to tackle the challenges of the 21st century and, on the other hand, a skillful workforce with higher employment rates. However, it should not be expected that students will develop CT skills and dispositions as a "byproduct" of learning in HE, as research has indicated that explicit instruction is required to foster CT in HE students (e.g., Abrami et al., 2015). In addition, previous research evidence highlights that improvement in CT skills and dispositions should be a matter of explicit rather than implicit expectations (Marin & Halpern, 2011; Tiruneh, Verburgh & Elen, 2014; Dominguez, 2018b). Given the importance of the HE instructors to provide explicit instruction for CT, their training on CT aspects is crucial. Scholars have formerly indicated that HE instructors do not have proper understanding of the concept of CT (e.g., Stedman & Adams, 2012). One might assume that, without the correct concepts and perceptions of CT, the instructor might believe that they are fostering or teaching CT, when, as a matter of fact, they do not (Stedman & Adams, 2012).

In order for HE to increase the employability of future graduates and development of soft skills, collaboration with Labour Market Organisations' (LMOs) experts has been, only recently, suggested as vital (Baaken, Kiel, & Kliewe, 2015; Rossano, Meerman, Kesting, & Baaken, 2016). However, a key question is whether and how LMOs promote CT to their personnel and to students participating in their internships. Is this the same case as with HE that LMOs Tutors not having the proper understanding of the CT concept? Our recent research (Dumitru et al., 2021) indicates that LMOs cultivate the development of CT with their personnel and with students during internships. Nurturing CT in LMOs takes place in action through the exploitation of specific cases and examples that could arise in the work-based context. This allows

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LMOs to exploit teaching and learning strategies aiming at narrowing the competencies the future graduates will need for specific work tasks and organisational adaptation, thus meeting different objectives than those HE wishes to attain. As previous research has indicated (e.g., Succi & Canovi, 2020), our findings underline that there is not a "gap" between HE and LMOs in promoting CT, rather that both HE and LMOs work in parallel towards the development of CT. Moreover, our results highlight LMOs promote CT more implicitly, while at the same time they are not familiarised with the scientific terminology about CT. On the one hand, it can be assumed that LMO Tutors do not have a clear understanding of the concepts of CT. On the other hand, a question remains: how can a common understanding between HE and LMOs be achieved to effectively promote CT skills development in future graduates? Training for LMOs tutors, similarly to HE instructors, is crucial for the development of common understanding not only on a theoretical basis (i.e., CT related knowledge), but also at a practical level, of how the UBC will be implemented based on mutual respect and support. The purpose of the current study was to develop a training course aiming at HE Instructors and LMO Tutors to foster the development of a common University-Business understanding not only on the scientific knowledge concerning CT but also on how this knowledge can be capitalised and brought into the collaborative curriculum design and delivery aiming at enhancing graduates' CT.

In order to reach the aforementioned aim, a Participatory Co-Design (PC-D) Approach has been followed for the development of the training course. Figure 1 describes how the PC-D methodology has been implemented along with the five main activities that resulted in the delivery of the training course.

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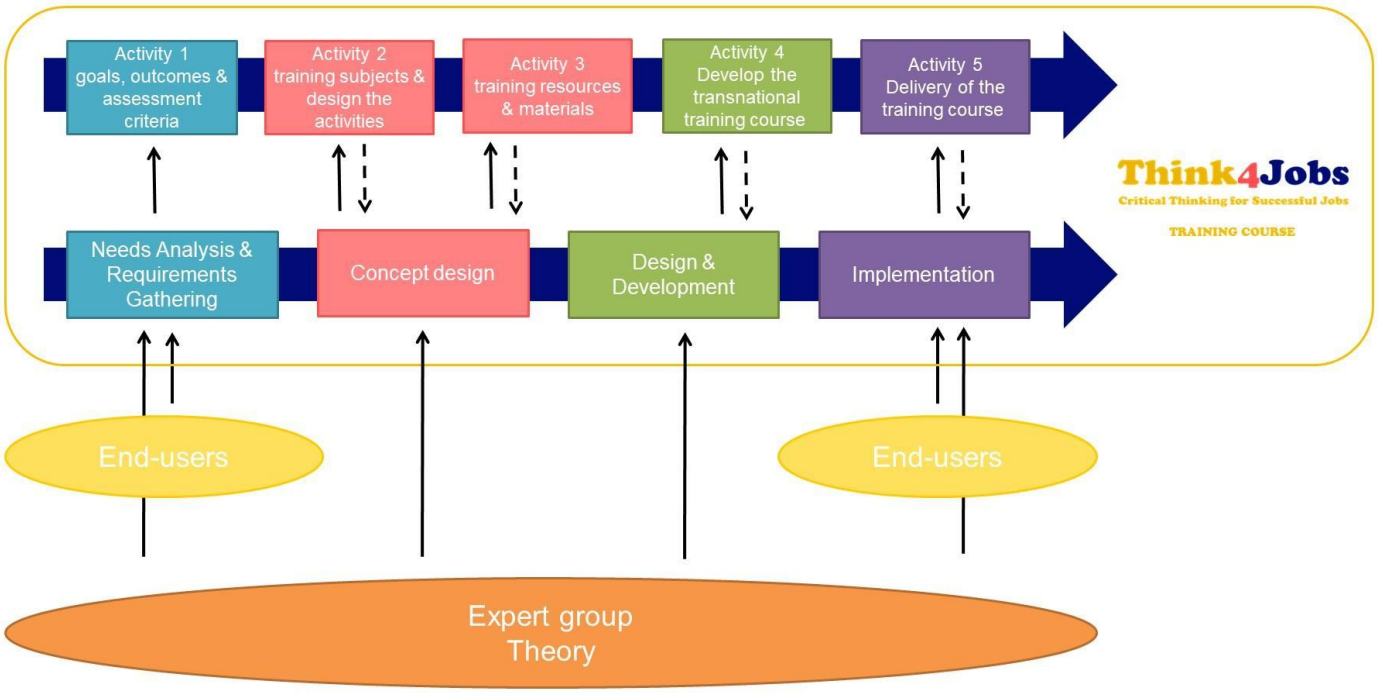

Figure 1: The Participatory Co-Design approach implemented for the design of the Think4Jobs Training Course for Higher Education Instructors and Labor Market Tutors.

The starting point of the design process was the needs assessment and requirements gathering of the course's end-users (i.e., Higher Education Instructors and Labor Market Organisations Tutors). Focus-group discussions were implemented with the end-users and as a result of the process, the expert group identified the goals, outcomes and assessment criteria of the course. During the next step, for the conceptualisation of the course, the agenda was developed clarifying the training subjects and activities as well as the training resources and supporting materials. Following the conceptualisation of the course, the development of the course was carried out by the expert team. Finally, at the stage of the implementation, the course was delivered and a pre-post design was implemented for data collection and evaluation of the course by the participants. To the best of our knowledge, this is the

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first attempt to exploit the PC-D approach for the design of a training course aiming to enhance HE Instructors and LMO Tutors' knowledge on CT as well as UBC for collaborative CT curriculum design and delivery. Three are the innovative elements of the training course. First, it is designed with a user-centred perspective addressing the specific needs of the end-users. Second, it engages labour market tutors in the training of CT in an attempt to develop a common understanding between the HE and LMOs on how to effectively promote CT in graduates. Third, it exploits a multiple-choice instrument incorporating a Certainty Response Index identifying not only participants' alternative concepts but also their level of confidence for each of their answers.

Later on, we will describe the process followed from the conceptualisation, the design, development, delivery and assessment of the CT training course for HE Instructors and Labor Market Tutors. The following sections of the Report follow the structure of the activities designed to meet the objective of Intellectual Output II (see Figure 1).

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The Think4Jobs Training: Goals, Outcomes and Assessment Criteria

The Think4Jobs Partnership exploited a Participatory Co-Design (PC-D) approach (Simonsen & Robertson, 2012) for the conceptualisation, design and development of the CT Training Course for HE Instructors and LMOs Tutors, namely the second Intellectual Output.

Introduction

PC-D is differentiated -to an extent- from other research methodologies implemented in the field of education (i.e., curriculum design). PC-D draws from other methodologies (i.e., participatory action research, ethnographic observations, interviews, requirements analysis, etc.). It is used to construct the emerging design which itself simultaneously constitutes and elicits the research results as it is co-interpreted by the designer-researchers and the participants who will use the output resulting from the design (Spinuzzi, 2005, p. 164). Thus, in the PC-D methodology, the design is research. PC-D flourished in Scandinavia and as an approach, it concerns the direct involvement of multidisciplinary groups of stakeholders (i.e., people with an interest or concern in something) in the co-design of products (e.g., mobile applications or a LE) they use, with an overarching aim to improve their effectiveness (Simonsen & Robertson, 2012). Stakeholders and experts in the PC-D are engaged in mutual collaboration in order to establish, develop and support mutual understanding and learning for the design of a product. Stakeholders engaged in the PC-D take the role of the end-users articulating the desired needs and requirements for the design. Moreover, experts ensure that the design will correspond to the stakeholders' needs, while at the same time, it will reflect the state of the art in science and academia. Stakeholders can be engaged in various steps of the PC-D approach (see Pnevmatikos, Christodoulou, & Fachantidis, 2020 for a review) such as the (i) Needs and Requirements Analysis, (ii) the Concept,(iii) the Prototyping and (iv) the Final Output.

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In each step, more specific activities are taking place such as design, evaluation, testing, piloting and refinement of the product (or any type of output). In the work carried out for the current report the PC-D approach is exploited, setting the Higher Education Instructors and the Labour Market Organisations Tutors in the center of the design process of the CT Training Course. Thus, in order to identify the goal, learning outcomes and assessment criteria for the CT Training Course, stakeholders (i.e., Higher Education Instructors and the Labour Market Organisations Tutors) were engaged in the first step of the design, namely "Needs and Requirements Analysis".

Method

Data Collection

In order to map stakeholders' needs and requirements, Focus Group (FG) discussions (Krueger & Casey, 2000) were deemed as the most appropriate data collection approach. UOWM prepared a set of guidelines on how to conduct the FGs. Further, it provided the materials that could trigger the discussion among the stakeholders participating in the FGs. Additionally, a training session was organised and implemented for all the Project' partners to ensure common understanding on conducting the FG discussions. Moreover, an invitation letter, a consent form and a thank you letter were prepared as templates so that partners could modify and provide them to the participants before and after the implementation of the FG discussions. The FG discussions were implemented primarily online, due to Covid-19 face-to-face meeting restrictions, and they lasted around 90 minutes. FG discussions were recorded and transcribed in local languages.

In total, nine FG discussions were implemented. In most cases each partner implemented a FG discussion, still in some cases a common FG discussion engaging both HE and LMOs was conducted. Specifically, the first part of the FG discussions aimed at ensuring participants' transactional validity (Koelsch, 2013; Whittemore,

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Chase, & Mandle, 2001) over the findings that emerged from the first round of FG discussions implemented for the first Intellectual Output (IO1). Thus, the most striking findings were presented and participants were asked to verify that the experts had properly interpreted the data. During the second part of the FG discussions, a specific set of questions was addressed to the participants (Table 1) considering the aims of the IO2.

In order to analyse the collected data, which were transcribed in local languages, a specific data analysis template based on the questions addressed to the participants during the FG discussions and the topics the LTTA should address was prepared and provided to the partners of the project. In some cases, partners from HE and LMOs prepared a common data analysis report, as they had also collaboratively implemented the FG discussions (e.g., ASE & BRD).

Table 1: The questions addressed to the Participants during the second part of the Focus Group Discussion.

How should Apprenticeships be designed to promote CT?
Is the apprenticeship adequate as it is right now in promoting students CT? Explain why.
How could CT be (further) promoted through the apprenticeship?
What is your role before, during and after students apprenticeships?
What do you expect from the students during their apprenticeships regarding CT?
How do you think your collaboration with the students could become more efficient in promoting their CT?
What role would you like to have in order to promote students' CT during apprenticeships?

Participants

During the FG discussions, participants were engaged based on a purposive sampling strategy (Etikan, Musa, & Alkassim, 2016). Specifically, the participants were HE

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instructors and LMOs Tutors, who in a later step of the project life-cycle would be engaged in the design and development of the CT blended apprenticeships curricula. The majority of participants were engaged also in the first round of FG discussions which were implemented for IO1. In addition, some of the participants engaged in the FG discussions were to take part in the LTTA. In total, 41 participants (HEI=17, LMOs=24) were engaged in the FG discussions across the five participating countries.

Data analysis

In order to analyse the reports provided by the partners, the basic principles of qualitative comparative analysis were followed (Berg-Schlosser, De Meur, Rihoux, & Ragin, 2009; Schneider & Wagemann, 2012). Specifically, this type of analysis compares one or more datasets in order to determine their consistency with one another. Basically, through qualitative comparative analysis, patterns across multiple cases are identified to better understand why some changes happen or not. Still, in the current study, we are not focusing on why a change is happening rather we focus on identifying the similarities and differences across the perspectives and practices employed in the various disciplines across the Partnership.

Results

Later on we present the various patterns that emerged for each one of the variables examined in FG discussions.

Apprenticeships description

The first variable of the data collection report concerned the apprenticeships/internships implemented in each organisation and their specific characteristics. This variable was essential to be investigated in order to share an understanding of how apprenticeships/internships are implemented across the five disciplines addressed by the consortium as well as to clarify the different

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conceptualisations that HE and LMOs hold regarding the apprenticeships and their potential role.

Four different modes of apprenticeships/internships were identified across the data. Firstly, the apprenticeships are organised mainly by the Higher Education Institution (HEI), while a limited scale support is provided by the LMOs during the implementation of the apprenticeships (e.g., students observe teachers in the school context, distributing students in schools). In addition, the HE Instructors support the students during the apprenticeships offering theoretical courses on instructional design at the beginning of the semester and later on, they provide reflection and evaluate students' efforts. Such a case is the apprenticeships in UOWM and VU. Secondly, there are apprenticeships/internships "under the umbrella" of the HEI, which nevertheless are carried out with the full responsibility of the students, who search an LMO in order to complete their obligations for the apprenticeship/internship (e.g., ASE & HSEL). In this case, HE Instructors have a limited role during the implementation of the apprenticeship/internship. Their main role is to evaluate the students at the end of the apprenticeship/internship based on a submitted paper. Thirdly, there is the case where internships/apprenticeships are taking place both in the HEI (i.e., shorter intramural traineeships) and the LMO (i.e., longer, curricular traineeship) according to the level of students' studies. In the first case, the trainees are passively engaged in the traineeships and they are assessed by a presentation and discussion of a case (clinical traineeships) or by the submission of a report. In the case of extramural traineeships, professionals are engaged as mentors for the trainees and the HEI is involved only for the establishment of an apprenticeship collaboration contract with the LMOs, where the traineeships will be implemented. Moreover, in this latter mode of apprenticeship, students engage in job shadowing for a short initial period, but soon students are engaged in performing tasks of increasing responsibility and complexity. This mode currently applies for the Veterinary Medicine

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discipline. Finally, there was the case of some LMOs (e.g., BRD and Orgadata) providing intensive training programs to the new personnel in specific aspects related with the work program. The aforementioned patterns make evident that the apprenticeships share similarities across similar disciplines such as Teacher Education and English as a Foreign Language or Economics and Business Informatics. However, it is apparent that there is little collaboration between the Universities and the LMOs for the implementation of the apprenticeships, while in some cases even the Universities have a limited role during the implementation of the apprenticeships.

Conceptual Knowledge

The second variable of the data collection report concerned the conceptual knowledge of participants in the FG. Investigating this variable was essential in order to see the pre-existing knowledge of participants and outline the gaps, where the training course could emphasise.

An interesting finding is that among almost all of the participants, CT was highlighted as the ability of a person to analyse, interpret and evaluate data as well as make inferences. Moreover the dispositions mentioned varied mostly based on the different disciplines, for instance for Teacher Education, open-mindedness was highlighted as an essential CT related disposition, analysis, interpretation, evaluation, explanation, truth-seeking, open-mindedness, and analyticity were outlined in Veterinary Medicine, while in Economics mostly cognitive maturity, systematicity and analyticity were mentioned. It was evident that the participants suggested various CT skills and dispositions according to various theoretical frameworks, however, in most cases, limited explicit references to CT specific theoretical frameworks (e.g., Facione) were captured by the FG participants. This reveals that there might be participants with limited understanding over the concept of CT and the nature of a good Critical Thinker.

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Procedural knowledge

Examining participants' previous procedural knowledge on CT would support the identification of the state-of-the-art approach? in each partner organisation thus, allowing the training course to move participants' knowledge beyond-the-state-of-the-art.

Participants in the FG discussions mentioned a variety of instructional approaches that could promote CT (e.g., problem based learning, case studies, debates, dilemmas, etc.). However, an interesting difference among the partner organisations' reports was that in some cases, it was implied that simply by engaging students with specific instructional approaches and teaching strategies such as argumentation, brainstorming, making challenging questions, and joint discussions between them and the instructor can promote their CT. Nevertheless, this assumption raises questions about the perceptions that HE Instructors have regarding CT instruction and brings to the foreground the importance of explicit CT instruction. Finally, in some cases (e.g., Veterinary Medicine), most likely due to the discipline specificities, both passive instructional approaches (e.g., observation) and active teaching methods (i.e., case studies) were highlighted.

Assessment knowledge

The next variable addressed in the data collection report was the assessment of CT. It was quite evident that among some HEI and LMOs some methods and approaches of CT assessment were exploited such as rubrics, essays and diaries. However, the majority of the participants indicated that they had vague knowledge and did not have clear understanding on how to assess CT or which tools to employ.

University-Business Collaboration during the Apprenticeships

The next six questions included in the data analysis report were related to the apprenticeships and specifically concerned aspects. These are their effectiveness, the

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role of the HEI and the LMOs during the apprenticeships, expectations from the students and ways to improve them as well as suggestions on how to alter the existing role that HEI and LMOs have during the apprenticeships. Examining these aspects was considered essential for the establishment of common language for the CT apprenticeships curriculum design and development.

It was evident in almost all cases that the University-Business Collaboration is perceived more as a transaction, where each party (i.e., HE or LMOs) is implementing their role without having an interconnection with the other party, rather than a mutually beneficial relationship. As almost all partners indicated, this has a negative impact on the apprenticeships, which in their majority are not considered adequate to promote CT in their current format, as opposed to the LMOs internships. In order to effectively promote CT in the apprenticeships it was suggested, among others, that instruction on CT should be explicit. In addition, some partners (e.g.,UOWM-Experimental School, ASE-BRD, UÉvora-HVA) suggested that the concept of mentorship should be reconsidered and reconceptualised in order to scaffold students' development of their CT and enhance UBC. Other suggestions were to develop joint courses between the HEI and the LMOs as well as to specify the collaboration between the HEI and the LMOs. Finally, it was suggested that the collaboration between HEI and the LMOs should be rebuilt on trust and mutual support, with enhanced ways of communication and a mutual sharing of experiences.

Discussion

The results from the FG discussions indicated that there might be some inaccurate perceptions regarding conceptual and procedural aspects of CT, while in some cases there might be lack of knowledge among the participants over other related concepts to CT, such as methods and practices of evaluating CT. In addition, an inadequate conceptualisation of the UBC has emerged from the partners' descriptions of the

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implemented apprenticeships. Taking into account the findings of stakeholders' needs and requirements gathering, the goals and the learning outcomes of the CT training course for HE Instructors and LMOs Tutors were defined (Table 2).

As the next Intellectual Outputs of the project will be the design, development, implementation and evaluation of CT blended apprenticeships curricula, it was considered essential for the partners to learn more on blended learning and the Moodle platform, which would be exploited for the implementation of the blended curricula. Thus, these concepts were also deemed essential to be included in the CT training course for HE Instructors and LMOs Tutors. Still, a brainstorming activity, which took place during a Monthly Project Meeting revealed that most partners were already exploiting Moodle or other Learning Management Systems in their Organisations (e.g., e-class, google classroom, etc.) thus, mapping previous ideas on the topic was not considered a priority for the FG discussions. Similar was the situation with the concept of blended learning.

Table 2: The goals and learning outcomes defined for the CT Training Course for HE Instructors and LMOs Tutors.

Goals	Learning Outcomes
During the LTTA enrolled participants should further improve their conceptual understanding of CT.	➔ After the end of the LTTA, participants will be able to distinguish the different aspects of the concept of CT. ➔ After the end of the LTTA, participants will be able to compare and contrast the different aspects articulated in the various CT definitions.
During the LTTA enrolled participants should further improve their understanding of how to teach for CT.	➔ After the end of the LTTA, participants will be able to exploit various instructional approaches in order to promote CT. ➔ After the end of the LTTA, participants will be able to acknowledge the importance of explicit instruction for developing students'

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	CT.
During the LTTA enrolled participants will further improve their understanding of how to evaluate CT.	➔ After the end of the LTTA, participants will be able to understand the factors affecting the assessment of CT. ➔ After the end of the LTTA, participants will be able to recognize tools for the assessment of CT.
During the LTTA enrolled participants will be familiarised with the basic principles of blended learning and Moodle.	➔ After the end of the LTTA, participants will be able to recognize basic formats of how blended learning could be implemented. ➔ After the end of the LTTA, participants will be able to design a course on Moodle and integrate basic tools in the course.
During the LTTA enrolled participants will enhance their understanding of UBC.	➔ After the end of the LTTA, participants will be able to develop a Memorandum of Understanding defining specifically their collaboration during the design, development, implementation and evaluation of the CT blended apprenticeships curricula.

In order to evaluate whether the goals and learning outcomes have been achieved after the end of the LTTA, a pre/post study design was implemented. Hence, specific assessment criteria were identified. The main assessment criteria were related to participants' acquired knowledge regarding the conceptual and procedural aspects of CT, as well as participants' knowledge on the evaluation of CT and understanding of the blended learning principles (Table 3).

Table 3: The assessment criteria defined for the CT Training Course for HE Instructors and LMOs Tutors.

Assessment criteria
➔ Participants' self-confidence in their knowledge about CT (conceptual, procedural, evaluation).
➔ Participants' self-confidence in their knowledge about blended learning and Moodle.
➔ Participants' self-confidence in their knowledge about University-Business Collaboration.

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- ➔ Participants’ self-efficacy in Moodle exploitation.
- ➔ Participants’ perceived competence in the LTTA.
- ➔ Participants’ motivation towards the LTTA
- ➔ Participants' acquired knowledge on CT aspects, blended learning and UBC.

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The Think4Jobs Training: Identification and Development of the Training Subjects, Activities, Materials and Resources

Taking into account the goals, learning outcomes and assessment criteria, which resulted from the involvement of end-users in the needs and requirements gathering step of the PC-D, the agenda of the Learning Teaching Training Activity (LTTA) was designed and developed. Each day of the LTTA focused on key-themes relevant to the goals and learning outcomes. In order to evaluate participants of the LTTA based on the assessment criteria, a pretest-posttest design was planned and time was allocated in the agenda (i.e., the respective sessions were carried out on the first and fifth day of the LTTA). Figure 2 presents the key themes of the LTTA.

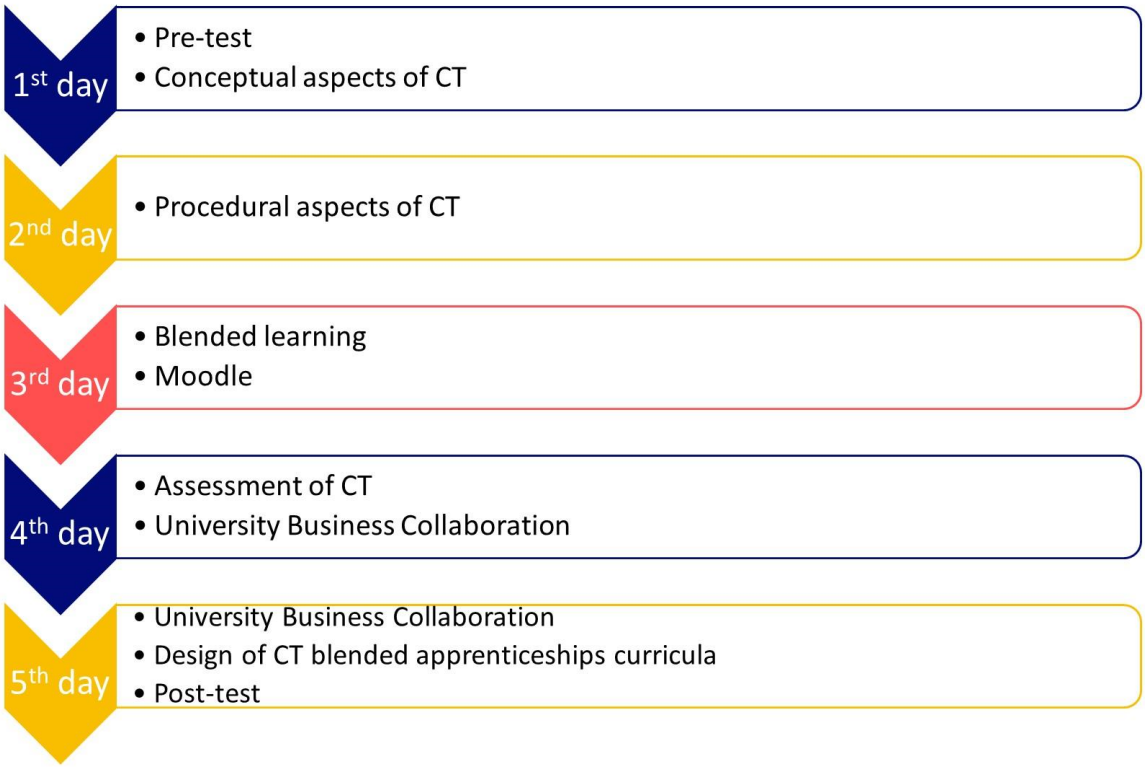

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Figure 2: The key-themes of the CT training course for HE Instructors and LMOs Tutors, implemented during the Learning Teaching Training Activity.

The agenda was presented to the core group members during a Monthly Consortium Meeting, to receive their feedback. Each day of the LTTA was planned to begin with the registrations and proposed a daily lunch break with a duration of an hour for the participants. Considering, on the one hand, that the LTTA was implemented with virtual mobility, and on the other hand, that the partners were coming from three different time zones (see Figure 3) the sessions began at 10.30 CEST and ended at 17.30 CEST. Later on we describe the agenda designed for the LTTA (see the Supplementary Materials section). The timetable of the agenda was considered appropriate by the core group members.

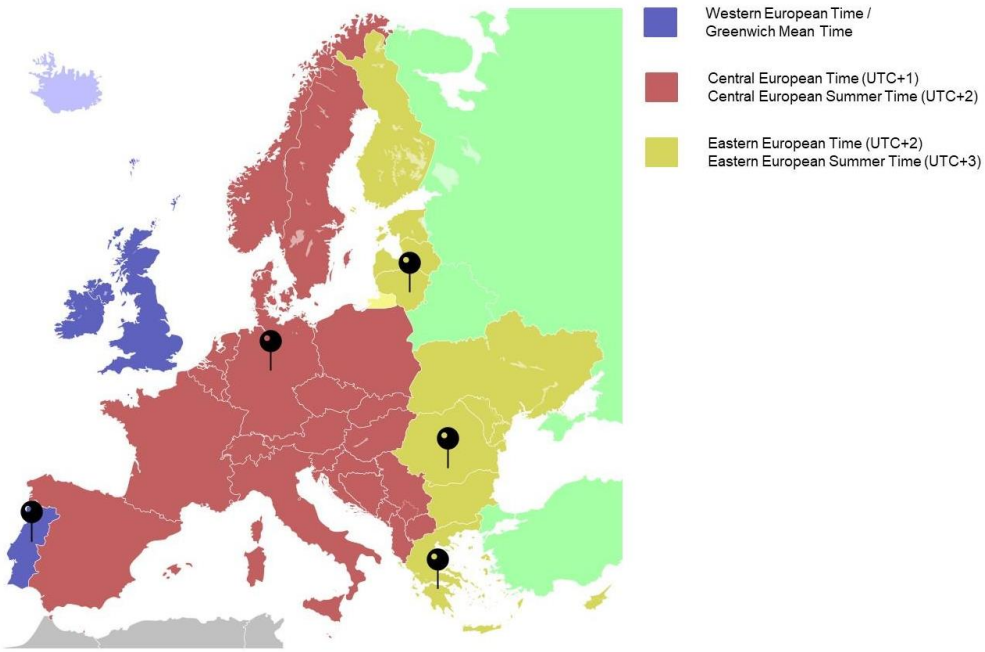

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Figure 3: The different time-zones of the participating organisations in the LTTA. Image retrieved and adopted from https://en.wikipedia.org/wiki/Eastern_European_Time

An intensive training session for some of the participants was proposed during the first day of the LTTA. The session aimed at preparing participants to undertake an additional role during the LTTA, namely that of the moderator of the group discussions which would take place during the "break-out rooms" activities. The session was planned to be intensive and each partner organisation had to participate with at least one representative. Among the tasks, moderators were to trigger discussions during the "break-out rooms" activities and present the work carried out in the rooms, to the plenary sessions. For the first day, two sessions focusing on the deconstruction and reconstruction of previously held ideas regarding CT were proposed. Additionally, during the sessions, time would be reserved for the development of a working definition on CT for the Think4Jobs project.

During the second day of the LTTA five different sessions were proposed after careful consideration and discussion with the project partners. The sessions focused on instructional approaches (e.g., problem based learning, work-based learning, case

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studies, the Konstanz Method of Dilemma Discussion) and teaching strategies (e.g., debate) that promote CT.

The third day of the LTTA focused on blended learning and Moodle. Three sessions were proposed, two of them focusing on Moodle and specifically the development of a course and relevant activities.

The fourth day of the LTTA proposed a session on the assessment of CT as well as the preparation of the Memorandum of Understanding (MoU) between HE and LMOs. The MoU aimed at developing a common understanding of the work that HE and LMOs partners would have to carry out in order to develop IO3 and IO4. For that purpose, two sessions were proposed to be devoted for the preparation of the MoUs.

The fifth day of the LTTA proposed a reflective session on the work carried out for the MoU and a session for the design and development of the CT blended apprenticeship curricula. One session during the first and the last day of the LTTA was devoted to the opening and closing ceremony of the LTTA.

The agenda of the event provided additional information to the participants, regarding the registration, the certificate of participation, contact information with the trainers and a video about Florina, the city where the LTTA would have been implemented, if Covid-19 allowed the consortium to travel with physical mobility.

Employing the ecosystemic approach, the consortium invited Trainers for the training course, by examining the expertise and experience of the partners engaged in the core group. Blended Learning and Moodle were two key themes on which the consortium core group members have only practical experience. Therefore, the organising institution, invited an external expert to provide the respective training sessions during the LTTA.

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Further, in order to develop the activities, materials and resources exploited for the LTTA multiple meetings were carried out with the Trainers and the Organising team. During these meetings it was ensured that the designed activities (i) were fulfilling the goals of the LTTA, (ii) were appropriate for the online mode of the LTTA, (iii) were respecting the timeline set for each session, (iv) would encourage participants to engage in group "hands-on" activities, that would enhance their level of relatedness and competence and (v) would enhance participants experiential learning.

During the LTTA and after the implementation of the sessions Trainers shared their materials in a pdf format to the organisers, who then created a file on the consortium's repository and uploaded all materials and resources organised per day. Additionally, the recordings of the sessions and photographs were uploaded on the project' s repository (see the section Supplementary Materials for a link to the training course materials and the recordings). Figure 4 presents a composition of visual items collected during the LTTA, depicting the materials and the implemented sessions.

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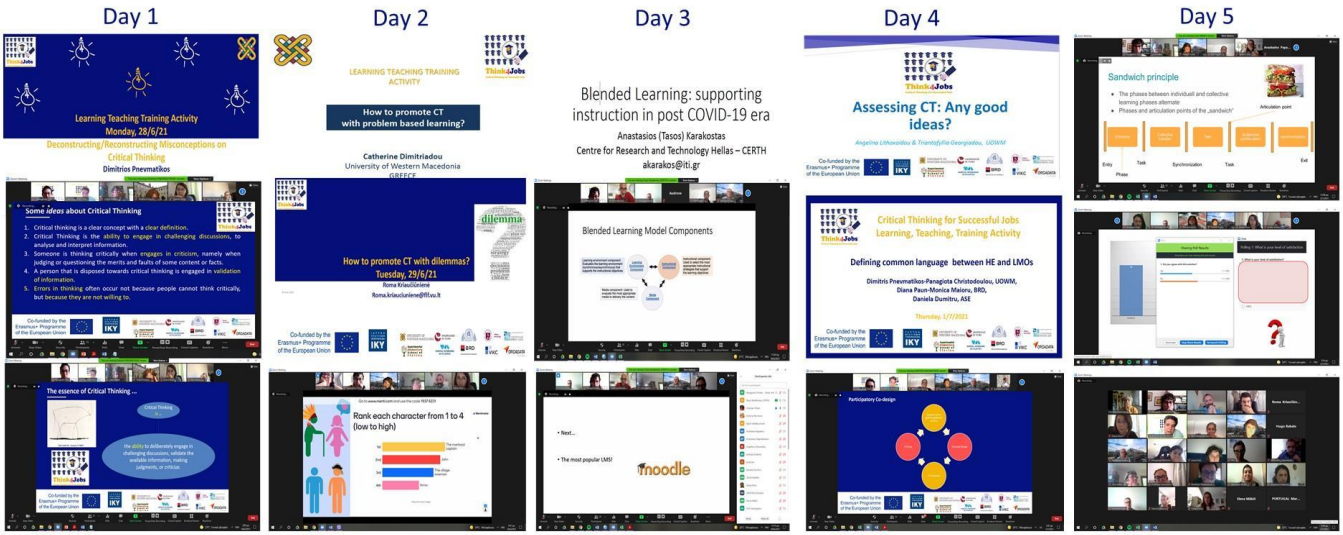

Figure 4: A composition of visual items that resulted from the sessions and the materials developed for the CT training course.

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The Think4Jobs Training: Delivery of the course

During the last step of the PC-D approach, the course was implemented in a five-day intensive training (from 28/6/21 until 2/7/21), which was organised by UOWM and was held virtually via Zoom. In order to examine whether the goals of the expected course learning outcomes were achieved, the results from the pre-post measurement were analysed. In addition, at the end of the course, participants evaluated the implemented course for its administrative and management implementation.

Method

Data collection

As described in the previous sections, a pre-post experimental design was implemented. Thus, an online questionnaire was prepared and shared to the participants engaged in the LTTA, at the beginning and at the end of the training course. The data collection tool consisted of seven distinct parts (122 items for the pre-test, 130 items for the post test). The first part of the questionnaire collected participants' demographic information (7 items in the pre test), such as participants' gender, country, field, discipline, their level of expertise and engagement with CT. The post-test included additional questions about the level of participants' commitment during the LTTA (9 items in the post test). Participants rated the question regarding their expertise in CT on a scale ranging from 1 (25%) to 5 (other). They also rated the questions regarding their engagement in promoting CT in instruction on a five point Likert scale, ranging from 1 (Not at all) to 5 (In every lecture). Further, the questions included in the post-test concerning the level of participants engagement in the LTTA were rated on a scale ranging from 1 (25%) to 5 (other).

The second part of the questionnaire collected data regarding the quality assurance indicators and assessment criteria defined in the first step of the PC-D (see previous section). Participants' level of perceived self-confidence in the issues addressed in the LTTA (6 items), the Moodle's ease of use (5 items) and perceived self-

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efficacy (5 items) (for more details on the self-efficacy scale, see Yeou, 2016) were measured with a five point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Two subscales of the Intrinsic Motivation Inventory (IMI) (e.g., Deci, Eghrari, Patrick, & Leone, 1994) were included in the second part of the questionnaire. The first concerned participants' perceived competence in the LTTA activities (6 items) and the second subscale was included in the post-test and concerned participants' interest/enjoyment of the LTTA activities (7 items). IMI is rated on a seven point Likers scale (1=Not at all true, 7=Very True).

The next five parts of the questionnaire included statements, which were either myths or facts and concerned conceptual (10 items) and procedural aspects (10 items) of CT, the evaluation of CT (10 items), blended learning (8 items) and the University and Business Collaboration (UBC) (8 items). The statements were identified either in the literature or through the data analysis reports that the partners submitted during the first PC-D step of requirements gathering and needs analysis. Participants were rating the statements as "Correct", "Incorrect" or "Do not know". In addition, participants denoted their level of confidence for each statement, in a scale ranging from 1 (Just Guessing) to 6 (Absolutely Confident). These statements (i.e., the Certainty Response Index) measured respondents' level of certainty in the statements included in the first tier of the questionnaire (Hasan et al., 1999). Exploitation of confidence ratings had its origin in the field of psychology, where individuals evaluated the accuracy of their performance in cognitive tasks (Stankov & Crawford, 1997). Similar data collection tools have been exploited in science education for the identification of misconceptions (e.g., Liampa, Malandrakis, Papadopoulou & Pnevmatikos, 2019). Table 4 presents indicative statements included in the five parts of the questionnaire addressing myths and facts about conceptual and procedural aspects of CT, about the evaluation of CT, blended learning and the collaboration between University and Business.

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Table 4: Indicative statements exploited in the questionnaire as myths and facts about various assessment criteria of the LTTA.

Assessment Criteria	Myths	Facts
Conceptual Aspects of CT	Someone is thinking critically when engaging in criticism, namely when judging or questioning the merits and faults of some content or facts.	Critical Thinking entails awareness of one's own thinking and reflection on the thinking of self and others as an object of cognition.
Procedural Aspects of CT	Students cannot develop their Critical Thinking, because there are no appropriate instructional approaches or teaching strategies that can promote the development of Critical Thinking.	It is important to direct students' learning so that the skills of Critical Thinking are learned in a way that will facilitate their recall in novel situations.
Evaluation of CT	Critical Thinking can be assessed through close-ended questions that prompt recall of previously acquired knowledge.	Critical Thinking assessment relies on recognition memory tasks (e.g. multiple-choice, ranking) or recall memory tasks (e.g. short-answer, essay).
Blended Learning	Blended learning is applied primarily when students complete online content by working asynchronously at school and at home.	Blended learning is achieved by in-person classroom time as well as individual online study using e-learning software.
University Business Collaboration	Collaboration between Higher Education Institutions and Labour Market Organisations is not necessary for the design and development of Higher Education Curricula.	Higher Education Institutions and Labour Market Organisations work in parallel regarding the promotion of Critical Thinking.

The reliability of the data collection tool was further examined through the calculation of Cronbach's alpha (Table 5). The value of the coefficient was in all cases acceptable and in some cases was excellent even revealing an excellent internal consistency of the scales.

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Table 5: Cronbach's alpha values for the pre-post test.

Variables	Cronbach's alpha pre-test	Cronbach's alpha post-test
Perceived self-confidence (6 items)	0.79	0.85
Moodle perceived ease of use (5 items)	0.95	0.92
Moodle perceived self-efficacy (5 items)	0.91	0.94
Perceived competence (6 items)	0.84	0.85
Interest/Enjoyment (7 items)	-	0.96

Finally, a short online questionnaire was administered at the post measurement with respect to the evaluation of the management and administration of the CT training course. The questionnaire included 15 closed ended questions which were measured through a five point Likert scale (1=Totally disagree, 5=Totally agree) and two open questions, where participants could provide their suggestions to help the improvement and implementation of future project activities and future transnational meetings.

Participants

According to the registrations, on a daily basis, 35 participants engaged in the LTTA. Most of them were members of the Partner Organisations of the Consortium, but there were two additional members participating in the event outside of the Partner Organisations. These two participants had either a consulting role for the Partner Organisations or were engaged in the External Evaluation and Quality Board of the Partnership.

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In total, 33 participants (22 female) from the five countries engaged in the pre-test. From the total number of participants in the pre-test, 22 were from HE and 11 were from LMOs. The post-test was completed by 26 participants (16 female) from which 16 were from HE and 10 were from LMOs. Figures 5 & 6 present the various disciplines that LTTA participants represented as these resulted from the pre- and post-tests, respectively. Although each country is involved in a specific discipline, it was evident that in some countries the working scientific groups were interdisciplinary.

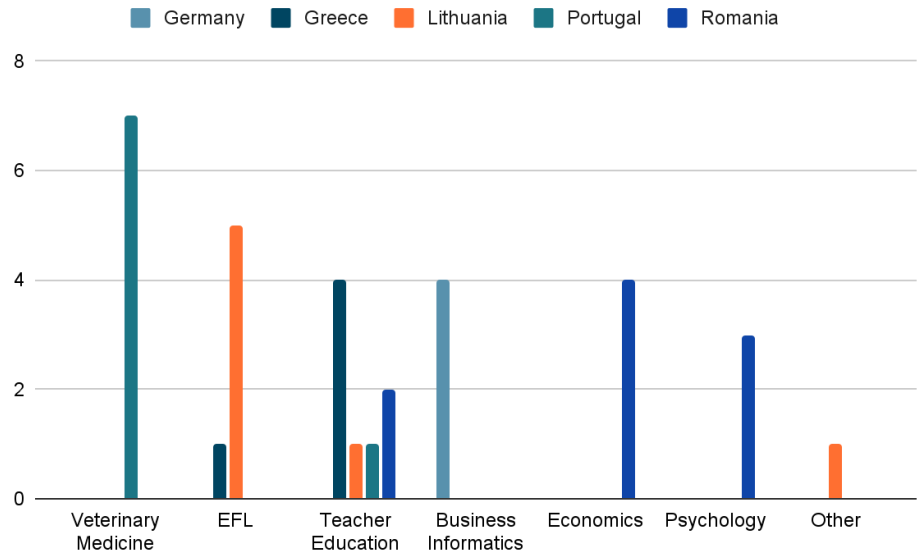

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Figure 5: The frequency of each discipline in the pre-test among the five consortium countries.

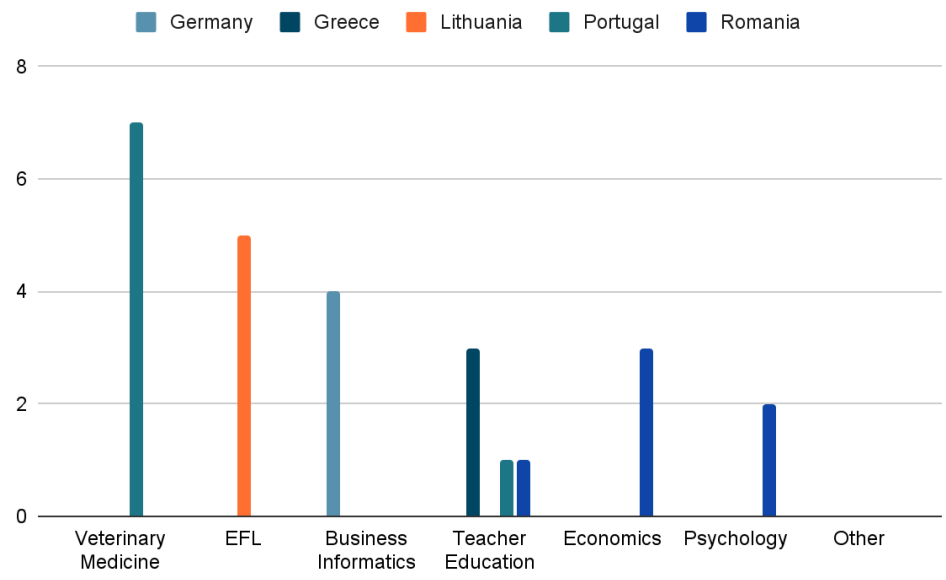

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Figure 6: The frequency of each discipline in the post-test among the five consortium countries.

Participants denoted at the pre-post-tests their level of expertise and engagement in instruction with CT. Figure 7 outlines that the majority of the participants (Npre=18 & Npost=14) perceived themselves as experts in CT at 75%.

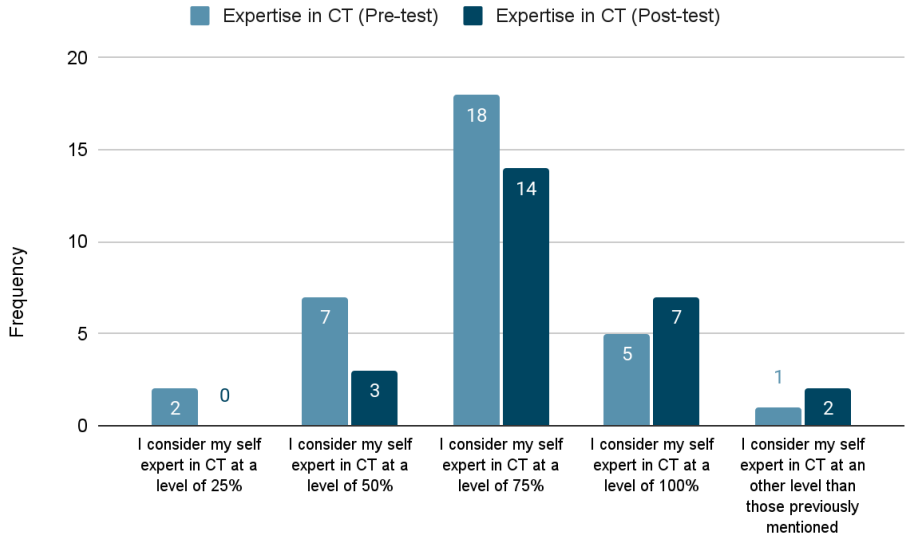

Figure 7: Participants' perceived level of expertise in Critical Thinking.

In addition, concerning participants' engagement in promoting CT during their instruction, the pre-test results indicated that the majority of participants (Npre=19) believe that they promote CT in many of their lectures during the semester . Consistent were the results of the post test regarding the majority of the participants (Npost=15). Figure 8 presents participants' perceptions in more detail .

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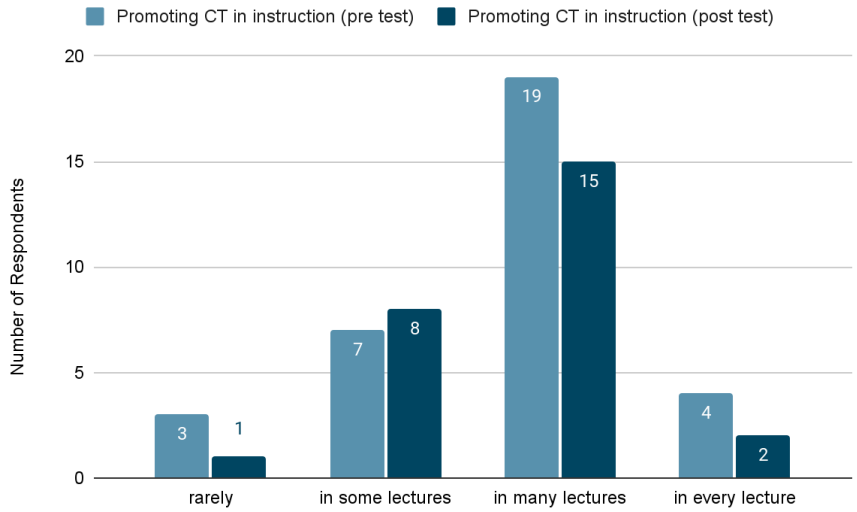

Figure 8: Participants' perceived level of engagement with Critical Thinking instruction.

Further, the majority of the participants indicated at the pre-test that they employ explicit instruction of CT in some lectures (Npre=17). However, a little less than half of the participants suggested that they employ explicit CT instruction in many of their lectures (Npost=12). Although the trend was consistent in the post test, the frequency of the endorsements was lower (Npost=11 & Npost=6, respectively). Figure 9 presents in more detail participants' perceptions regarding explicit instruction of CT.

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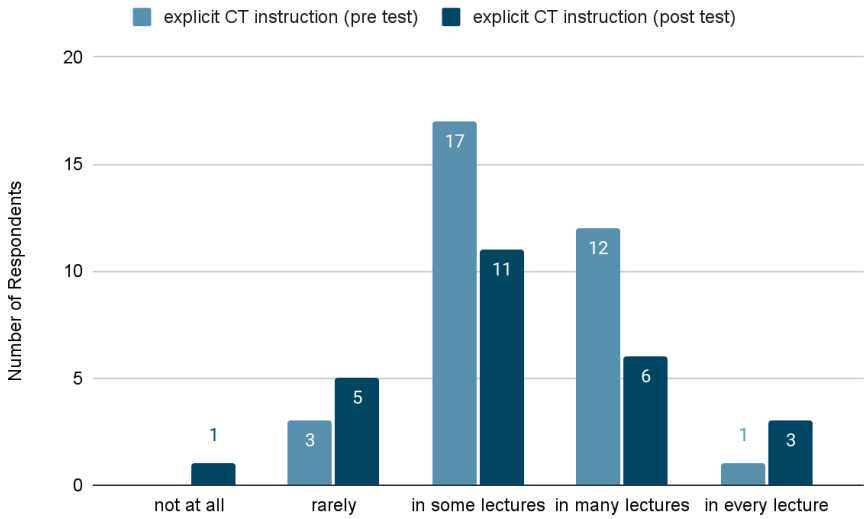

Figure 9: Participants' perceived level of engagement with Critical Thinking instruction.

Finally, in the post-test participants indicated the self-perceived percentage of attendance at the sessions of the LTTA as well as their level of commitment to the sessions they participated (Figure 10). The majority of the participants (N=21) indicated that they were actively attending the sessions of the LTTA (100%), however, almost half of the participants denoted high commitment (100%) to the sessions of the LTTA (N=11), while the other half denoted less commitment (75%) to the sessions they attended (N=11).

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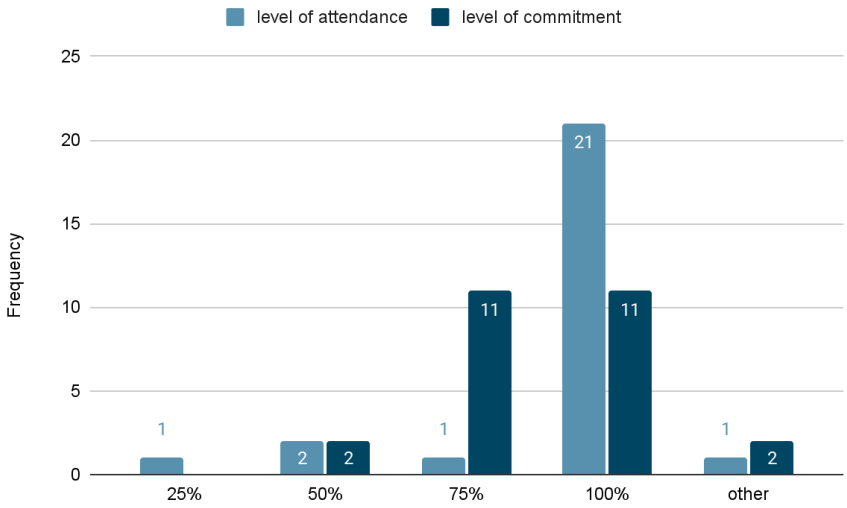

Figure 10: Participants' perceived level of attendance and commitment to the LTTA sessions.

Data analysis

The resulting data from the five variables of the data collection tool, which included statements measuring participants' previous knowledge on conceptual and procedural aspects of CT, the evaluation of CT, blended learning and the University-Business Collaboration, along with their confidence level were categorized into six categories. The first category (i.e., Misconceptions/Confidence) included answers endorsing statements that were not in accordance with the scientific view, but were endorsed with high confidence. Such answers highlight that participants are thinking intuitively and they are indicators of misconceptions.

The second category (i.e., Misconceptions/Inconfidence) included answers endorsing non-scientific statements with less confidence and the third category (i.e., Scientific/Inconfidence) included answers, which endorsed scientific statements with less confidence. Answers falling under these two categories denoted that participants

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either considered their counterintuitive concepts unsatisfactory, or they experienced uncertainty of the compatibility of their concepts with the scientific view.

The fourth category (i.e., Scientific/Confidence) included scientific statements, which were endorsed with high confidence. Such answers highlighted that participants are aware that their concepts are in line with the scientific view.

Finally, answers included in the fifth (i.e., Ignorance/Inconfidence) and sixth categories (i.e., Ignorance/Confidence) highlighted that participants are lacking knowledge in the specific variables.

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Results

In order to investigate whether the training course, delivered during the LTTA, reached the goals set during the first step of the PC-D, we investigated whether there was a difference between the pre- and post- measurements regarding the various variables in data collection (i.e., self confidence, self-efficacy in Moodle, conceptual and procedural understanding of CT, evaluation of CT, blended learning, University-Business Collaboration, motivation).

Multiple exact sign tests were performed to compare the differences between the two measurements, regarding the variables of participants' self-confidence, ease of use and self-efficacy on Moodle and self-competence. However a statistically significant median increase elicited only in participants' perceived self-confidence on the topics addressed during the LTTA (Table 6). In addition, the exact sign tests performed to compare the differences between the two measurements for respondents from HE and LMO revealed a statistically significant median increase only for HE participants' perceived self-confidence (Figure 11).

Table 6: Statistical significance of the mean score of the scales of perceived self-confidence, Moodle perceived ease of use, Moodle perceived self-efficacy, perceived self-competence.

Variables	Quartiles						Sign test
	pre-test	post-test	pre-test	post-test	pre-test	post-test	

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	25th		**Median**		75th		
Perceived self-confidence	3.08	3.83	3.66	4.00	4.00	4.50	*p=.004**
Moodle perceived ease of use	3.00	3.75	4.00	4.00	4.00	4.70	*p=.523*
Moodle perceived self-efficacy	3.00	3.15	3.80	4.00	4.30	4.65	*p=.541*
Perceived self-competence	4.91	4.62	5.33	5.41	5.83	6.00	*p=1.000*
*p<.005							

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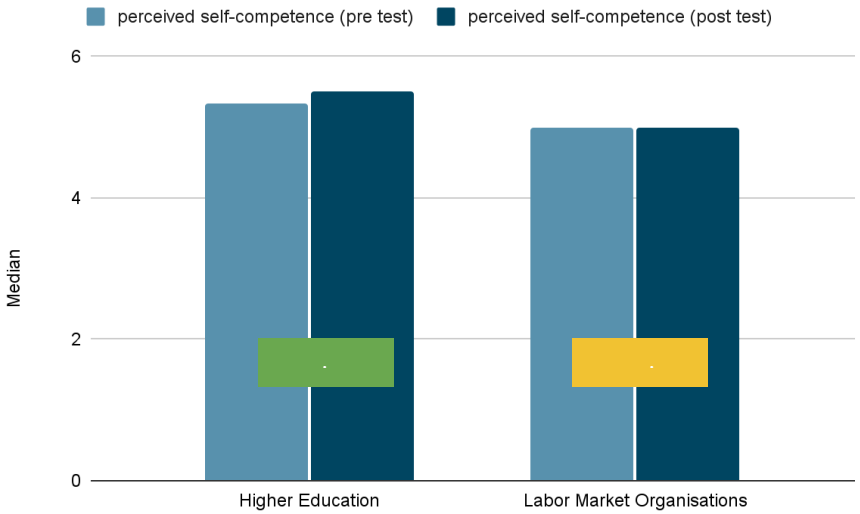

Figure 11: Comparison between the two measurements for participants from Higher Education and Labor Market Organisations regarding their perceived self-competence.

The post-measurement revealed that participants considered the training course as quite interesting and enjoyable (M=5.89, SD=1.15). However, the Mann-Whitney U tests performed, revealed no statistically significant difference between female and male participants (U=74, p=.751) regarding their interest in the course. Moreover, no statistically significant difference between participants

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from HE and LMOs was revealed (U=69, p=.560). With respect to the country, a Kruskal-Wallis U test showed that there was not a statistically significant difference in participants' interest among the countries, x2 (4)=3.356, p=.500, with a mean rank interest score of 19.17 for Greek participants, 13.38 for Portuguese participants, 12.88 for Lithuanian participants, 12.08 for Romanian participants and 9.13 for German participants. Finally, a Kruskal-Wallis U test showed that there was not a statistically significant difference in participants' interest among the various disciplines represented in the course, x2 (5)=5.688, p=.338, with a mean rank interest score of 17.90 for participants from the discipline of Teacher Education, 15.20 for participants from the discipline of English as a Foreign Language, 14.00 for participants from the discipline of Business Economics, 13.79 for participants from the discipline of Veterinary Medicine, 9.25 for participants from the discipline of Business Informatics and 5.00 for participants from the discipline of Psychology.

Later on we describe the results with respect to the knowledge participants acquired during the course regarding conceptual and procedural aspects of CT, evaluation of CT, blended learning and University-Business Collaboration (UBC).

Conceptual aspects of CT

Table 7 presents the percentage of endorsements per category of answers regarding the non-scientific statements, namely the myths, concerning the CT conceptual knowledge both in the pre- and the post-test. Three out of the five myths (i.e., 1, 2, 5) divided participants' answers as almost half of the participants endorsed the statements during the pre-test, while almost half of the participants recognized the statements as incorrect. A slight decrease at the percentage of the endorsed myths was revealed at the post-measurement, and a

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slight increase in the acknowledgement of the incorrect statement was observed. Interestingly, two myths (i.e., 3, 4) were endorsed by more than half of the participants both at the pre- and the post-measurement, implying the difficulty to de-construct all the existing misconceptions during the LTTA. In all five myths, participants' answers indicating a lack of knowledge were less than 10% in the pre-test, a percentage that decreased more in the post-test. Nevertheless, the exact sign test which was used to compare the differences between the two measurements did not elicit a statistically significant median increase in participants' conceptual understanding of CT myths (Table 8).

Table 7: Endorsement of myths regarding conceptual knowledge between the pre-post measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. Someone is thinking critically when engaging in criticism, namely when judging or questioning the merits and faults of some content or facts.	39.4%	30.8%	-	-	6.1%	3.8%	36.4%	57.7%	3%	7.7%	-	-
2. Critical thinking is a clear concept with a clear definition.	30.3%	15.4%	-	-	9.1%	-	54.5%	80.8%	6.1%	3.8%	-	-

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3. Critical Thinking is the ability to engage in challenging discussions, to analyse and interpret information.	90.9%	84.6%	3%	-	3%	3.8%	-	7.7%	3%	3.8%	-	-
4. A person that is disposed towards critical thinking is engaged in validating information.	63.6%	88.5%	9.1%	-	3%	-	12.1%	7.7.%	6.1%	3.8%	6.1%	-
5. Errors in thinking often occur not because people cannot think critically but because they are not willing to.	42.4%	38.5%	3%	3.8%	6.1%	-	36.4%	46.2%	9.1%	7.7%	3%	3.8%

Table 8: Statistical significance of the mean score of the myths regarding CT conceptual knowledge between the pre-post test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. Someone is thinking critically when engaging in criticism, namely when judging or questioning the merits and faults of some content or facts.	2.73	3.42	1.206	1.027	*p=.064*
2. Critical thinking is a clear concept with a clear definition.	3.36	3.73	.994	.778	*p=.125*

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3. Critical Thinking is the ability to engage in challenging discussions, to analyse and interpret information.	2.09	2.31	.579	.788	*p=.375*
4. A person that is disposed towards critical thinking is engaged in validating information.	2.61	2.27	1.345	.778	*p=1.000*
5. Errors in thinking often occur not because people cannot think critically but because they are not willing to.	3.15	3.27	1.253	1.282	*p=.481*

Table 9 presents the percentage of endorsements per category of answers regarding the scientific statements, concerning the CT conceptual knowledge both in the pre- and the post-test. Four out of the five statements (i.e., 1,2,3,5) were endorsed as scientific, during the pre-test, by more than half of the participants. One statement revealed a conflict among participants' answers in the pre-test, as less than half of them perceived that the statement was correct, while one quarter of the participants denoted their lack of knowledge while answering the question and another quarter of the respondents were in bewilderment regarding the nature of the statement. The exact sign test which was used to compare the differences between the two measurements elicited only one statistically significant median increase in participants' conceptual understanding of CT facts (i.e., Fact 4) (Table 10).

Table 9: Endorsement of facts regarding CT conceptual knowledge between the pre-post measurements.

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Statement	Misconception/ Inconfidence		Misconception/ Confidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. The ideal critical thinker can be characterized for both her or his cognitive skills and also her or his habits of mind.	-	-	6.1%	3.8%	12.1%	-	75.8%	92.3%	6.1%	3.8%	-	-
2. Critical Thinking has been related to analytic thinking processes, which are purposeful, self-regulatory, conscious and effortful.	3%	-	6.1%	-	6.1%	-	66.7%	96.2%	15.2%	3.8%	3%	-
3. Critical Thinking entails awareness of one's own thinking and reflection on the thinking of self and others as an object of cognition.	3%	-	-	3.8%	12.1%	-	75.8%	88.5%	9.1%	3.8%	-	-
4. Critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood.	3%	-	12.1%	7.7%	12.1%	7.7%	45.5	80.8%	27.3%	3.8%	-	-
5. Critical thinking is valued as a vehicle that promotes sound assertions and enhances understanding.	-	-	6.1%	-	15.2%	3.8%	69.7%	84.6%	6.1%	11.5%	3%	-

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Table 10: Statistical significance of the mean score of the facts regarding CT conceptual knowledge between the pre-and pos- test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. The ideal critical thinker can be characterized for both her or his cognitive skills and also her or his habits of mind.	2.18	2.19	.950	.694	*p=1.000*
2. Critical Thinking has been related to analytic thinking processes, which are purposeful, self-regulatory, conscious and effortful.	2.67	2.12	1.339	.588	*p=.727*
3. Critical Thinking entails awareness of one's own thinking and reflection on the thinking of self and others as an object of cognition.	1.21	2.35	.600	1.018	*p≤.001**
4. Critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood.	2.97	2.19	1.489	.849	*p=.267*
5. Critical thinking is valued as a vehicle that promotes sound assertions and enhances understanding.	2.27	2.31	1.180	1.011	*p=.277*
*sig<.001					

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Procedural knowledge of CT

Table 11 presents the percentage of endorsements per category of answers regarding the non-scientific statements, namely the myths, concerning the CT procedural knowledge both in the pre- and the post-test. The first incorrect statement regarding the procedural knowledge of CT was acknowledged by the majority of the participants as such in both the pre- and post-test. In addition, at the post-test some of the participants who originally thought that the statement is aligned with the scientific view, identified the sentence as non-scientific. The second non-scientific statement was recognized by the majority of the participants in the pre-test and only a slight increase in the level of endorsement was noticed in the post-test. The third and sixth statements conflicted the participants as half of them endorsed them as scientific statements during the pre-test but did not denote high confidence in their answers. Still, after the end of the course, half of the participants endorsed the statement as incorrect but their confidence level was not increased. The fourth statement divided participants' endorsements during the pre-test, as almost half of them considered the statement correct and half of them considered it incorrect. The percentage of participants endorsing the statement as incorrect was increased during the post-test, but still, 30% considered the statement to be in accordance with the scientific view. The fifth statement was endorsed by more than three quarters of the participants both in the pre- and post-measurements, revealing a robust misconception. The last statement included in the pre measurement as a non-scientific statement was perceived by more than half of the participants as incorrect. Still, there was a quarter of the participants indicating that they lacked knowledge. The post measurement revealed an increase in participants' endorsement of the statement but with low confidence implying that the participants might have acquired some knowledge on the topic after their

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participation in the training course, which was nevertheless not in accordance with the scientific view. The exact sign test, which was used to compare the differences between the two measurements elicit one (i.e., first myth) statistically significant median increase in participants' procedural understanding of CT (Table 12).

Table 11: Endorsement of myths regarding CT procedural knowledge between the pre-post measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. Students cannot develop their Critical Thinking because there are no appropriate instructional approaches or teaching strategies that can promote the development of Critical Thinking.	24.2%	7.7%	6.1%	-	-	-	60.6%	76.9%	3%	11.5%	3.1%	3.8%
2. Critical thinking can only be taught in those disciplines, where explicit problem-solving methodologies can be applied.	9.1%	3.8%	-	-	6.1%	-	84.8%	88.5%	-	3.8%	-	3.8%
3. Critical thinking involves generic operations that can be learned by following a set of steps, apart from any particular knowledge	12.1%	%	54.5%	53.8%	-	3.8%	27.3%	38.5%	-	3.8%	6.1%	-

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domains, and can be transferred to or applied in different contexts.												
4. Engaging my students in (group) discussions or brainstorming activities suffice to foster the development of their Critical Thinking.	3%	-	42.5%	34.6%	-	-	51.5%	61.6%	3%	3.8%	-	-
5. Aiming at fostering Critical Thinking, asking challenging questions to my students and presenting to them opposite views on a topic seem appropriate teaching strategies to exploit.	6.1%	3.8%	81.8%	88.5%	-	-	6.1%	3.8%	3%	3.8%	3%	-
6. Teaching critical thinking is primarily a matter of developing thinking skills.	9.1%	11.5%	66.7%	57.7%	3%	-	9.1%	19.2%	12.1%	7.7%	-	3.8%
7. Engaging students in implicit instruction of Critical Thinking without reflection on their meta-thinking can foster students' Critical Thinking.	-	-	3%	30.8%	9.1%	-	63.6%	61.5%	24.2%	7.7%	-	-

Table 12: Statistical significance of the mean score of the myths regarding CT procedural knowledge between the pre-and post-test.

Statement	Mean	Std. Deviation	Sign test

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	pre-test	post-test	pre-test	post-test	
1. Students cannot develop their Critical Thinking because there are no appropriate instructional approaches or teaching strategies that can promote the development of Critical Thinking.	3.48	4.04	1.253	.774	*p*=.039*
2. Critical thinking can only be taught in those disciplines, where explicit problem-solving methodologies can be applied.	3.76	4.04	.614	.599	*p*=.219
3. Critical thinking involves generic operations that can be learned by following a set of steps, apart from any particular knowledge domains, and can be transferred to or applied in different contexts.	2.67	2.92	1.339	1.055	*p*=.267
4. Engaging my students in (group) discussions or brainstorming activities suffice to foster the development of their Critical Thinking.	3.09	3.35	1.100	1.018	*p*=1.000
5. Aiming at fostering Critical Thinking, asking challenging questions to my students and presenting to them opposite views on a topic seem appropriate teaching strategies to exploit.	2.27	2.12	1.008	.653	*p*=1.000
6. Teaching critical thinking is primarily a matter of developing thinking skills.	2.48	2.65	1.176	1.355	*p*=1.000
7. Engaging students in implicit instruction of Critical Thinking without reflection on their meta-thinking can foster students' Critical Thinking.	4.09	3.46	.678	1.029	*p*=.077

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*sig<.05

Table 13 presents the percentage of endorsements per category of answers regarding the scientific statements, namely the facts, concerning the CT procedural knowledge both in the pre and the post test. More than half of the participants endorsed the statements in the pre-test, highlighting that their previous concepts are in line with the scientific view. The percentage of endorsement of the scientific statement increased even more in the post-test. Less than 10% of the participants considered the statements as incorrect during the pre-test, a percentage that decreased during the post-test. The exact sign test, which was used to compare the differences between the two measurements, did not elicit a statistically significant median increase in participants' procedural understanding of CT (Table 14).

Table 13: Endorsement level of facts regarding CT procedural knowledge between the pre-post measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. There are specific types of questions that I can use to trigger students' different critical	-	-	-	-	12,1%	-	75.8%	92.3%	9.1%	3.8%	3%	3.8%

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thinking skills and critical thinking dispositions.												
2. When engaging in Critical Thinking, a person needs to monitor her/his thinking process, check whether progress is being made toward an appropriate goal, ensure accuracy and make decisions about the use of time and mental effort.	3%	7.7%	6.1%	3.8%	15.2%	-	54.5%	84.6%	15.2%	3.8%	6.1%	-
3. It is vital to direct students' learning so that the skills of Critical Thinking are learned in a way that will facilitate their recall in novel situations.	-	-	9.1%	3.8%	12.1%	-	72.7%	92.3%	6.1%	3.8%	-	-
4. Various instructional approaches can benefit my students towards the development of their Critical Thinking skills, such as problem-based learning, dilemma's discussions, case studies, and ill-structured problems.	-	-	-	-	6.1%	-	93.9%	96.2%	-	3.8%	-	-

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Table 14: Statistical significance of the mean score of the facts regarding CT procedural knowledge between the pre-post test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. There are specific types of questions that I can use to trigger students' different critical thinking skills and critical thinking dispositions.	2.27	2.27	1.180	.962	*p*=.453
2. When engaging in Critical Thinking, a person needs to monitor her/his thinking process, check whether progress is being made toward an appropriate goal, ensure accuracy and make decisions about the use of time and mental effort.	2.67	2.31	1.514	.788	*p*=1.000
3. It is vital to direct students' learning so that the skills of Critical Thinking are learned in a way that will facilitate their recall in novel situations.	2.24	2.15	1.001	.613	*p*=.453
4. Various instructional approaches can benefit my students towards the development of their Critical Thinking skills, such as problem-based learning, dilemma's discussions, case studies, and ill-structured problems.	1.94	2.12	.242	.588	*p*=.500

Evaluation of CT

Table 15 presents the percentage of endorsements per category of answers regarding the incorrect statements, namely the myths, concerning the evaluation of CT in the pre- and the post-test. Regarding the first statement, a quarter of the participants considered the

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statement as correct, revealing their misconception on the topic. Despite the Training course this concept was endorsed higher among the participants at the post measurement, by more than 30% of the participants. The rest of the statements (i.e, 2, 3, 4, 5, 6, 7) were rejected by the majority of the participants both at the pre- and the post-test, implying that the previously held concepts of the participants were in line with the scientific view. The exact sign test, which was used to compare the differences between the two measurements, did not elicit a statistically significant median increase in participants' understanding of the aspects related to the evaluation of CT (Table 16).

Table 15: Endorsement of myths regarding evaluation of CT between the pre- and post-measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. There is certainty in how to best assess critical thinking, both as a skill and as a learning outcome.	18.2%	34.6%	6.1%	%	9.1%	%	63.6%	57.7%	3%	3.8%	-	3.8%
2. Critical Thinking can be assessed through close-ended questions that prompt recall of previously acquired knowledge.	3%	7.7%	3%	-	9.1%	-	75.8%	84.6%	9.1%	7.7%	-	-

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3. By assessing only argumentation skills, you assess Critical Thinking.	18.2%	11.5%	-	3.8%	3%	%	60.6%	73.11%	12.1%	11.5%	6.1%	-
4. There is no valid way to assess abstract and not easy to define concepts, such as Critical Thinking.	36.4%	26.9%	3%	3.8%	6.1%	-	48.5%	50%	6.1%	11.5%	-	7.7%
5. You can not assess Critical Thinking with any tool. CT is unconscious rather than a conscious mind process.	3%	-	3%	-	6.1%	3.8%	75.8%	92.3%	9.1%	3.8%	3%	-
6. The evaluation of Critical Thinking is impossible.	-	7.7%	-	-	3%	3.8%	84.8%	80.8%	12.1%	3.8%	-	3.8%
7. Critical Thinking of a person can be evaluated only in the praxis, not in the class.	-	3.8%	-	-	6.1%	-	87.9%	92.3%	3.8%	6.1%	-	-

Table 16: Statistical significance of the mean score of the myths regarding CT evaluation between the pre- and post-tests.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	

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1. There is certainty in how to best assess critical thinking, both as a skill and as a learning outcome.	3.39	3.42	1.029	1.137	*p*=1.000
2. Critical Thinking can be assessed through close-ended questions that prompt recall of previously acquired knowledge.	3.85	3.92	.755	.628	*p*=1.000
3. By assessing only argumentation skills, you assess Critical Thinking.	3.85	3.77	1.064	.951	*p*=.549
4. There is no valid way to assess abstract and not easy to define concepts, such as Critical Thinking.	3.18	3.62	1.103	1.329	*p*=.648
5. You can not assess Critical Thinking with any tool. CT is unconscious rather than a conscious mind process.	3.94	4.00	.827	.283	*p*=.727
6. The evaluation of Critical Thinking is impossible.	4.09	3.92	.384	.744	*p*=.727
7. Critical Thinking of a person can be evaluated only in the praxis, not in the class.	4.00	3.96	.354	.455	*p*=1.000

Table 17 presents the percentage of endorsements per category of answers regarding the scientific statements, namely the facts, concerning the evaluation of CT in the pre and post tests. It is evident that at least a quarter of the participants denoted their lack of knowledge while considering the nature of the statements in both pre- and post-testing. Some statements (e.g., 2,4) outlined that more than 10% of the participants lacked knowledge in evaluating their nature, even at the post-test. Furthermore, the second statement

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revealed that 20% of the respondents considered the statement as a myth rather than a fact. The third statement revealed a misconception that almost the majority of the participants retain regarding the evaluation tools for CT. Surprisingly, regarding the last statement -although at the pre-measurement it was endorsed by more than 65% of the participants- at the post-measurement it was revealed that more than a quarter of the participants had evaluated it as a myth. The exact sign test, which was used to compare the differences between the two measurements, did not elicit a statistically significant median increase in participants' understanding of the evaluation of CT (Table 18).

Table 17: Endorsement level of facts regarding evaluation of CT between pre- and-post-measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. Critical Thinking assessment can incorporate case studies, projects, group discussions, simulations that draw on material from multiple courses, real-world activities, and problem-based activities.	-	-	-	-	3%	3.8%	93.9%	92.3%	3%	3.8%	-	-
2. There are numerous critical thinking	18.2%	26.9%	9.1%	3.8%	6.1%	11.5%	27.3%	38.5%	21.2%	7.7%	18.2%	11.5%

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assessment tools available to educators and employers.												
3. Critical Thinking assessment relies on recognition memory tasks (e.g. multiple-choice, ranking) or recall memory tasks (e.g. short-answer, essay).	63.6%	73.1%	9.1%	3.8%	6.1%	-	6.1%	7.7%	12.1%	15.4%	3%	-
4. Evaluating the degree a person avoids intuitive judgment and engages in analytical, deliberate thinking can indicate that the person employs Critical Thinking.	3%	26.9%	3%	-	21.2%	3.8%	48.5%	57.7%	18.2%	11.5%	6.1%	-

Table 18: Statistical significance of the mean score of the facts regarding evaluation of CT between the pre-post tests.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. Critical Thinking assessment can incorporate case studies, projects, group discussions, simulations that draw on material from multiple courses, real-world activities, and problem-based activities.	2.06	2.08	.556	.628	-
2. There are numerous critical thinking assessment tools available to educators and employers.	3.76	3.15	1.640	1.592	*p*=.383

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3. Critical Thinking assessment relies on recognition memory tasks (e.g. multiple-choice, ranking) or recall memory tasks (e.g. short-answer, essay).	3.79	3.96	1.053	.720	*p*=.791
4. Evaluating the degree a person avoids intuitive judgment and engages in analytical, deliberate thinking can indicate that the person employs Critical Thinking.	2.67	2.85	1.614	1.223	*p*=.629

Blended Learning

Table 19 presents the percentage of endorsements per category of answers regarding the incorrect statements, namely the myths, concerning participants' knowledge on blended learning before and after the training course. The first two statements (i.e., 1, 2) divided participants, as almost half of them endorsed the statements and half of them recognised the statements as incorrect. However, the post-measurement revealed an increase in the participants' rejection of the myth percentage regarding the first statement, while the percentage of endorsement of the second statement was slightly increased. Regarding the third statement, almost three quarters of the participants rejected the statement, a percentage that reached more than 90% in the post measurement, implying that participants' conceptions were most likely in line with the scientific view. An interesting finding resulted in regard to the last statement, as almost half of the participants endorsed the statement in the pre-test, a percentage that was even more increased in the post measurement. The exact sign test, which was used to compare the differences between the two measurements, revealed one statistically significant median increase in participants' understanding regarding the first statement about blended learning (Table 20).

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Table 19: Endorsement of myths regarding blended learning between the two measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. Blended learning is applied primarily when students complete online content by working asynchronously at school and at home.	39.4%	42.3%	15.2%	-	15.2%	3.8%	30.3%	46.2%	-	3.8%	-	3.8%
2. All blended learning classrooms are student-centred.	27.3%	38.5%	6.1%	3.8%	6.1%	11.5%	33.3%	30.8%	-	7.7%	-	7.7%
3. The instructor should follow specific steps to implement blended learning effectively.	-	-	-	-	24.2%	-	51.5%	92.3%	12.1%	7.7%	12.1%	-

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4. There is only one Type of Blended Learning Approach.	42.4%	69.2%	18.2%	7.7%	3%	3.8%	18.2%	11.5%	12.1%	3.8%	6.1%	3.8%

Table 20: Statistical significance of the mean score of the myths regarding blended learning between the pre- and post-test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. Blended learning is applied primarily when students complete online content by working asynchronously at school and at home.	2.61	3.23	1.088	1.177	*p*=.013*
2. All blended learning classrooms are student-centred.	3.61	3.23	1.499	1.366	*p*=.286
3. The instructor should follow specific steps to implement blended learning effectively.	4.12	4.08	.927	.272	*p*=.581

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4. There is only one Type of Blended Learning Approach.	2.82	2.46	1.550	1.174	*p*=.824
*sig<.05					

Table 21 presents the percentage of endorsements per category of answers regarding the scientific statements, namely the facts, concerning participants' knowledge of blended learning between the pre- and post-tests. The first statement highlighted that more than 35% of the participants lacked knowledge on the respective topic during the pre-measurement, a percentage that decreased in the post-measurement. At the same time, 30% of the participants endorsed the statement during the pre-test. Although this percentage improved during the post-test, it revealed an increase in the percentage of respondents considering the statement as incorrect. The second statement revealed an underlying erroneous concept that participants held in both measurements, as almost half of them evaluated the statement as incorrect. Moreover, the statement was endorsed as scientific, but with a low level of confidence by more than 35% of the participants in the pre-test, a percentage that increased during the post-measurement. Still, it can be argued that participants were in bewilderment regarding the nature of the statement. The last two statements were endorsed by half of the participants in the pre-measurements and the majority of the participants in the post-measurement, thus it can be assumed that respondents' concepts were

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most likely in line with the scientific view. Still, the exact sign test, which was used to compare the differences between the two measurements did not elicit a statistically significant median increase in participants' understanding of blended learning (Table 22).

Table 21: Endorsement of facts regarding blended learning between the pre- and post-test.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. A learning environment can be synchronous or asynchronous, and blended learning leverages the distinct set of advantages and disadvantages for each communication mode to ensure the optimum use of resources to attain the instructional goal and learning objectives.	15.2%	26.9%	3%	3.8%	12.1%	3.8%	18.2%	42.3%	36.4%	11.5%	15.2%	11.5%

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2. Blended learning is achieved by in-person classroom time as well as an individual online study using e-learning software.	21.2%	30.8%	21.2%	3.8%	36.4%	57.7%	-	-	15.2%	3.8%	6.%	3.8%
3. Blended learning involves e-learning content and instructor-led elements, not online and classroom content.	-	-	3%	-	36.4%	3.8%	51.5%	92.3%	9.1%	3.8%	-	-
4. Short-term intensive blended learning courses can prove more beneficial for students in comparison to semester-long blended learning interventions.	3%	3.8%	3%	3.8%	30.3%	-	42.4%	76.9%	18.2%	11.5%	3%	3.8%

Table 22: Statistical significance of the mean score of the facts regarding blended learning between the pre-and post-test.

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Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	
1. A learning environment can be synchronous or asynchronous, and blended learning leverages the distinct set of advantages and disadvantages for each communication mode to ensure the optimum use of resources to attain the instructional goal and learning objectives.	3.91	3.35	1.702	1.522	*p*=.238
2. Blended learning is achieved by in-person classroom time as well as an individual online study using e-learning software.	2.97	2.35	1.704	1.672	*p*=.824
3. Blended learning involves e-learning content and instructor-led elements, not online and classroom content.	1.94	2.08	1.116	.628	*p*=.065
4. Short-term intensive blended learning courses can prove more beneficial for students in comparison to semester-long blended learning interventions.	2.45	2.62	1.563	1.235	*p*=.167

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University Business Collaboration

Table 23 presents the percentage of endorsements per category of answers regarding the incorrect statements, namely the myths, concerning participants' knowledge on the University-Business Collaboration (UBC) before and after the training course. The first statement was recognised by the majority of the participants as a non-scientific statement in both measurements. The second statement revealed that at the pre-measurement, at least one quarter of the participants had lack of knowledge on the topic and that more than half of the participants endorsed the misconception. The results in the post-measurement highlighted that half of the participants considered the statement as non-scientific. Results concerning the third statement outlined that almost 40% of the participants lacked knowledge and thus could not answer the question and that 30% of the respondents evaluated the statement as non-scientific. The post measurement revealed that half of the participants rejected the statement as a myth, however, a quarter of the participants endorsed the statement with confidence, implying that they most likely developed a misconception after the participation in the course. Similar were the results regarding the last statement. Almost half of the participants indicated in the pre-measurement that they lacked knowledge, a quarter of the participants endorsed the statement and 30% of the participants rejected it as a non-scientific statement. Results differed in the post-measurement, where more than half of the participants rejected the statement as incorrect. Still, more than 20% of the participants endorsed the statement in the post-measurement. The exact sign test, which was used to compare the differences

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between the two measurements, did not reveal a statistically significant median increase in participants' understanding regarding the first statement about blended learning (Table 24).

Table 23: Endorsement of myths regarding University-Business Collaboration between pre- and post-measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. Collaboration between Higher Education Institutions and Labour Market Organisations is not unnecessary for the design and development of Higher Education Curricula.	3%	7.7.%	3%	-	-	-	84.8%	88.5%	9.1%	3.8%	-	-
2. Labour Market Organisations do not have the experience to consult Higher Education Institutions regarding the design and development of curricula in Higher	27.3%	26.9%	-	-	-	3.8%	39.4%	50%	15.2%	11.5%	18.2%	7.7%

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Education.												
3. The greater the number of years that an academic staff works at a Higher Education Institution, the more they tend to cooperate with business.	9.1%	26.9%	3%	-	12.1%	3.8%	30.3%	50%	27.3%	11.5%	18.2%	7.7%
4. The Labour Market Organisations cannot have an active role at the Higher Education apprenticeships/ internships.	9.1%	19.2%	3%	3.8%	12.1%	-	30.3%	53.8%	27.3%	7.7%	18.2%	15.4%

Table 24: Statistical significance of the mean score of the myths regarding University-Business Collaboration between the pre- and post-test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	

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1. Collaboration between Higher Education Institutions and Labour Market Organisations is not unnecessary for the design and development of Higher Education Curricula.	3.94	3.88	.704	.588	*p*=1.000
2. Labour Market Organisations do not have the experience to consult Higher Education Institutions regarding the design and development of curricula in Higher Education.	3.97	3.69	1.425	1.225	*p*=1.000
3. The greater the number of years that an academic staff works at a Higher Education Institution, the more they tend to cooperate with business.	4.24	3.88	1.324	1.366	*p*=1.000
4. The Labour Market Organisations cannot have an active role at the Higher Education apprenticeships/ internships.	3.97	3.88	.467	.588	*p*=1.000

Table 25 presents the percentage of endorsements per category of answers regarding the scientific statements, namely the facts, concerning participants' knowledge on UBC between the pre- and post-tests. Results concerning the first statement highlighted that the majority of the participants endorsed the statement, however, during the post-measurement the percentage of endorsements decreased to more than half of the respondents, while a quarter of them considered the statement as incorrect, indicating that they most likely

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developed a misconception after the training course. The second and third statements divided participants at the pre-measurement, as almost half of them endorsed the statement, while more than 30% perceived the statements as myths. During the post-measurement the percentage of endorsements increased, but still a considerable number of participants rejected the statements as incorrect. Nevertheless, the exact sign test, which was used to compare the differences between the two measurements did not elicit a statistically significant median increase in participants' understanding of UBC facts (Table 26).

Table 25: Endorsement of facts regarding University-Business Collaboration between the two measurements.

Statement	Misconception/ Confidence		Misconception/ Inconfidence		Scientific/ Inconfidence		Scientific/ Confidence		Ignorance/ Inconfidence		Ignorance/ Confidence	
	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test	Pre test	Post test
1. There is a lack of awareness of how Higher Education Institutions and Labour Market Organisations can cooperate and how these activities (inter)relate.	6.1%	23.1%	-	3.8%	3%	-	87.9%	61.5%	3%	11.5%	-	-

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2. Higher Education Institutions and Labour Market Organisations have different aims, objectives and purposes in the type of education they offer.	36.4%	23.1%	6.1%	3.8%	-	3.8%	42.4%	57.7%	6.1%	3.8%	9.1%	7.7%
3. Higher Education Institutions and Labour Market Organisations work in parallel regarding the promotion of Critical Thinking.	30.3%	34.6%	9.1%	-	-	-	51.5%	57.7%	9.1%	7.7%	-	-

Table 26: Statistical significance of the mean score of the facts regarding University-Business Collaboration between the pre-post test.

Statement	Mean		Std. Deviation		Sign test
	pre-test	post-test	pre-test	post-test	

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1. There is a lack of awareness of how Higher Education Institutions and Labour Market Organisations can cooperate and how these activities (inter)relate.	2.18	2.85	.727	1.156	*p*=.146
2. Higher Education Institutions and Labour Market Organisations have different aims, objectives and purposes in the type of education they offer.	3.33	2.88	1.339	1.366	*p*=.210
3. Higher Education Institutions and Labour Market Organisations work in parallel regarding the promotion of Critical Thinking.	2.97	2.92	1.104	1.129	*p*=.774

Concerning the evaluation of the CT training course in terms of its management and administration participants provided encouraging feedback of the quality of the implemented event. In particular, respondents agreed that the agenda of the LTTA was provided in time (M=4.96, SD=.209), and the sessions started as planned in the agenda (M=4.91. SD=.288), the objectives of the training course were clear (M=4.48, SD=.898), the topics in the agenda were consistent with the objectives of the LTTA (M=4.65, SD=.775), sufficient time was allocated to each topic of discussion (M=4.39, SD=1.033), the LTTA scaffolded partners in carrying out the expected project activities (M=4.13, SD=1.217), all partners contributed to the successful fulfillment of the meeting (M=4.70, SD=.559). Furthermore, participants

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agreed that the materials produced before and during the LTTA facilitated the work carried out by the partners during the LTTA (M=4.52, SD=.947). With respect to the chair of the LTTA, it was agreed that he summarized the main points of discussion during the sessions (M=4.87, SD=.458) and the LTTA was considered to promote good working relationships among the partners (M=4.70, SD=.635). Participants agreed that time was equally allocated to all partners (M=4.78, SD=.518) and that all opinions were taken into consideration during the LTTA (M=4.83, SD=.388). On terms of self-evaluation, participants neither agreed, nor disagreed with the statement indicating that they were prepared to discuss the topics included in the agenda (M=3.78, SD=.998). Furthermore, respondents agreed that the decisions reached during the sessions were clear to them after the end of the LTTA (M=4.48, SD=.730). Finally, participants disagreed with the statement suggesting that the LTTA did not correspond to their expectations (M=2.22, SD=1.650). With respect to the open ended questions, the respondents provided only a few suggestions with respect to the implemented LTTA, rather than suggestions that could help improve future project activities or transnational meetings. Among the most frequently mentioned suggestions was that having more time for discussions during break-out rooms would be more beneficial, as well as that more joint presentations by HEI and LMOs should have been implemented during the LTTA.

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Discussion

For the design and development of the CT training course for HE Instructors and LMO Tutors, the PC-D approach was employed. End-users, namely HE Instructors and LMO Tutors, were engaged at the first and final step of the process, providing their needs and requirements for the course as well as their feedback at the end of the course. A pre-post design was exploited to investigate whether the goals and expected learning outcomes of the CT training course were reached. The results indicated a statistically significant increase in participants self-confidence at the post-measurement regarding the aspects addressed in the training course, specifically for the participants serving HE. Self-confidence reflects individuals' perception of their capacity to achieve a particular goal in a specific situation (Pintrich & McKeachie, 2000; as cited in Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006). Thus, it can be assumed that participants will have CT aspects, blended learning and UBC in the center of their teaching context due to their level of self-confidence. This assumption is grounded on previous research results indicating that HE Instructors decide to teach in a particular way, when they are confident about their perceived content knowledge (e.g., Sadler, 2013).

The results of the pre-post design revealed also that participants perceived the CT training course as quite interesting and enjoyable. This is an encouraging finding considering that the participants perceived themselves as somewhat experts in the field of CT learning and instruction. Their level of interest could be related to the activities implemented during the training course, which were designed in order to satisfy participants' basic psychological needs of competence, autonomy and relatedness (Deci & Ryan, 2013; Ryan & Deci, 2000).

The training course contributed to highlighting misconceptions that participants have on CT, blended learning and UBC. However, only a few statistically significant differences between the two measurements were identified. These

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differences were evident primarily in participants' level of confidence while endorsing or rejecting the statements. Still, such a finding is considered justified. On the one hand, research on conceptual change (e.g., Vosniadou, 2013; Vosniadou & Skopeliti, 2014) has outlined that in order to develop a scientific concept, ontological, epistemological and representational changes must take place in individuals' previously held concepts (Vosniadou, 2013). Thus, conceptual change requires time and cannot be achieved overnight. Considering also that even scientists have not reached consensus on various aspects related to CT (e.g., definition, nature, assessment), it can be understood that achieving conceptual change can be a challenging and demanding task (Vosniadou, 2013). On the other hand, the obtained results can be attributed to participants' previous expertise and experience in CT. The majority of the participants have been previously engaged in activities of the CRITHINKEDU European project (2016-1-PT01-KA203-022808) or other local CT projects and they might have considered teaching of CT as highly essential prior to their participation in the training course. This is also evident by the level of self perceived expertise that participants denoted during the pre-test, where more than half of the participants considered themselves as "quite" experts or experts in the field of CT. Thus, they might have been biased regarding the content knowledge that they would be exposed to, during the current training course. Finally, it can be assumed that if the number of participants in the post-measurement was the same as the pre-measurement, more statistically significant differences between the two measurements would have been identified.

Apart from the quantitative data collected during the delivery of the CT training course, one major qualitative accomplishment was the development of a Memorandum of Understanding (MoU) between each pair of HEIs and LMOs partner per country. The MoU set a specific framework on the expected collaboration between HE and LMOs for the design-development (IO3), implementation and

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evaluation (IO4) of the CT blended apprenticeships curricula. Particularly the MoUs are expected to be the roadmap for the implementation of the next steps of the project. Each pair, namely a HEI and a LMO partner, considering the discipline based specificities as well as the country specificities prepared a MoU to further specify and clarify the activities described in the project's proposal (see the section Supplementary Materials for the MoUs). Moreover, the MoUs described the specific role that each partner would have during the implementation of the forthcoming activities of the project. In addition, a more specific timeline for the implementation of the activities was described in the MoUs. Thus, it is perceived that a common understanding on the design and delivery of CT blended apprenticeships curricula has been achieved and that UBC has been tailored to each pair of contributors.

Furthermore, at an administrative and management level, the evaluation of the CT training course was motivating, indicating that participants appreciated the quality of the implemented CT training course.

Overall, the CT training course presented in the current report has contributed to the existing research and literature in various ways. First, it exploits a PC-D approach from the conceptualisation of to the delivery of the course, which is a novel approach for the design of a training course aiming at CT and UBC. Second, it actively engaged HE Instructors and LMOs in a common training course. Third, the developed MoUs are considered a major output of the CT training course and an essential contribution to the UBC literature as it is a practical indicator of how HE and LMOs have reached a common understanding developed on mutual understanding and support. Finally, the current report contributes to the literature with the exploitation of a multiple-choice instrument incorporating a Certainty Response Index identifying not only participants' alternative concepts but also their level of confidence on aspects of CT, blended learning and UBC.

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Nevertheless, the generalisability of the current findings is subject to certain limitations. For instance, the sample of the study was limited and results should be considered with caution. In addition, in the CT training course, participants from specific disciplines both from HE and LMOs were engaged, thus the needs and requirements that resulted from the first step of the PC-D might differ for participants from different disciplines. Moreover, the majority of the participants had previous knowledge on CT aspects and had been previously engaged in CT instruction. Thus, the findings might not reflect the overall population of HE Instructors or LMOs Tutors. Despite the fact that participants indicated a high level of participation and commitment to the CT training course sessions, the online mode of the LTTA might have an impact on participants. The CT training course was originally expected to be delivered with physical mobility and face-to-face instruction, but due to Covid-19 travelling restrictions it was delivered online. Hence, it can be assumed that participants' level of attention and concentration might have decreased after a prolonged participation in the online event or due to digital multitasking (e.g., Parry & le Roux, 2021; Vedechkina & Borgonovi, 2021).

The CT training course is considered to have a direct impact on the increase of the target groups' awareness and susceptibility towards the implementation of CT in their HEI courses and apprenticeships as well as the labour market in-service trainings or apprenticeships. Further, participants' capacity building is considered to be improved. Moreover, it is expected that it will have an impact upon the institutional strategy of the organizations (both HEI and LMOs), which could employ the CT training course as a systematic in-service training of their staff. Finally, the statistics obtained from the social media channels of the partnership during the implementation of the LTTA, outlined that the public image and networking of the project was positively affected.

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Supplementary Materials

Below you can find a Table providing a list with all the supplementary materials that supported the design, development and implementation of the Training Course and the LTTA (Table 27).

Table 27: Supplementary Materials and their corresponding links.

Materials	Link
Agenda of the LTTA	https://think4jobs.uowm.gr/wp-content/uploads/2021/06/LTTA_Agenda_Final_v3.pdf
Infographic of the LTTA (developed for dissemination purposes)	https://www.youtube.com/watch?v=VI9FeBfjQT0
LTTA photo collage	https://think4jobs.uowm.gr/wp-content/uploads/2021/07/T4J-LTTA-Photo-Collage-1.pdf
Recordings of the LTTA	https://drive.google.com/drive/folders/1xnl64yEvDjAwklUOJ9zYTquYkQL8hmCR?usp=sharing
Materials of the LTTA	https://drive.google.com/drive/folders/1xnl64yEvDjAwklUOJ9zYTquYkQL8hmCR?usp=sharing
Memorandum of Understanding: UOWM-Experimental School of Florina	https://drive.google.com/file/d/1Cjdsc8YfHJAiah9y4qu-FQQ_8DaFALuA/view?usp=sharing
Memorandum of Understanding: ASE-BRD	https://drive.google.com/file/d/1doC_KpfHHPe8fMQTjz7OEkpQX8P4-7Zw/view?usp=sharing
Memorandum of Understanding: UÈvora-HVA	https://drive.google.com/file/d/1NOFYetGA3oX6lek6IhwqRk99wCUpIM0P/view?usp=sharing
Memorandum of Understanding: HSEL-Orgadata	https://drive.google.com/file/d/1C6MjtlRt_GHnaWlEf5WhX9MVGdNAZGZt/view?usp=sharing
Memorandum of Understanding: VU-VIKC	https://drive.google.com/file/d/1fTbW3y9w2mnZVeOnJLOo3fU-dUk5Tywy/view?usp=sharing

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