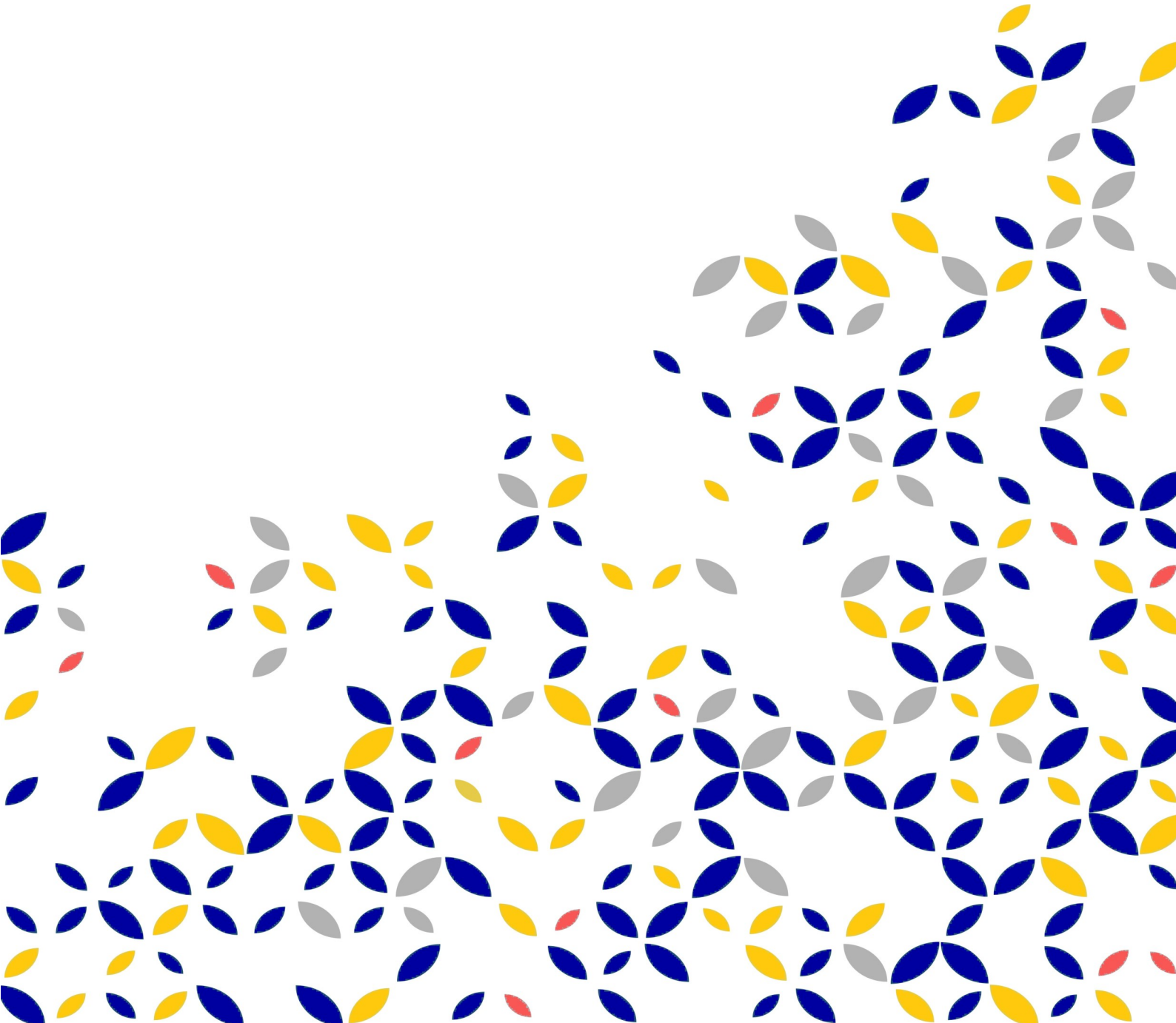
Think4Jobs

Critical Thinking for Successful Jobs

THINK4JOBS TOOLKIT

Ten work-based learning scenarios



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Executive summary and key findings

The current report is the first Intellectual Output (Output 1) of the THINK4JOBS initiative, which aims at improving students' CT skills and dispositions by promoting collaboration between Higher Education Institutions (HEIs) and Labour Market Organizations (LMOs). This is the case since according to relevant research findings, LMOs seem to expect employees to acquire CT skills in order for them to successfully address the needs of their work positions. Under this rationale, partners of the two aforementioned fields have decided to redesign and ameliorate HEI curricula by blending both HEIs and LMOs' experience, knowledge and recommendations, while instilling this evidence into students' apprenticeships. Apprenticeships offering practice in professional skills can actively lead to students' understanding of their working environment and simultaneously scaffold CT development with the employment of mentoring. For this reason, the THINK4JOBS initiative exploits apprenticeships as a means of CT exploration and learning through which bridging the gap between HEIs and LMOs can be attained. Therefore, it is considered that in this fashion, students will be acquainted with the concept of CT and also be in the position of transferring it into their work settings, when entering the workplace. It should be noted that partners of the THINK4JOBS project are representatives from five disciplines (teacher training, English as a foreign language – EFL, business economics, business informatics and veterinary medicine), who formed teams between HEI and LMOs for each of these disciplines in order for ideas to be pluralized and CT to be explored across a variety of domains.

The current report has a twofold aim:

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· to trace and map the methods and/or techniques that CT is currently employed in HEIs and LMOs' apprenticeships and apprenticeships focusing on any possible convergent or divergent points;

· to thoroughly describe and suggest work-based, learning scenarios that could bridge the gap between HEIs and LMOs' curricula and simultaneously attempt to safeguard the requirements for graduates' CT development and improvement.

Mapping the Gap

Regarding the first aim of the report, three research methods (observation, focus groups and documentary analysis) were employed in combination with three instruments (observational matrix, focus group rubric and documentary analysis rubric). Each research instrument includes a set of variables, which are majorly organized in three categories:

I. Pedagogical aspects of CT development (including class objectives, teaching strategies/methods, tools/materials and evaluation regarding CT)
II. CT aspects (including the ways CT is nurtured, triggered and explicitly taught during instruction)
III. Implementation of CT (including elements of CT presence in these disciplines)

For each variable, a set of indicators, drawing on CT and pedagogical theory was also developed in order for the aforementioned research instruments to be constructed.

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Stakeholders (HEI students and instructors as well as LMO tutors, employers and employees) participated in the mapping process. Data were collected during the winter semester 2020-2021 and a total of 134 participants from all partner countries participated in the focus groups discussions. Regarding the other two research methods, observation was carried out in at least three apprenticeships or courses, with at least four observation sessions for each of them. As far as it concerns the documentary analysis, documents supporting the courses/apprenticeships, which were observed, were analyzed according to the relevant rubric. Findings from each research instrument were triangulated according to each discipline and are thoroughly described in the current report in separate sections.

However, some general conclusions seem to derive from a holistic approach to data analysis. Initially, it was suggested that even though a definitive "gap" between HEIs and LMOs does not seem to exist, there is a different context in CT approach since universities usually employ different learning activities focusing more on career preparation with long-term goals while LMOs follow compact and short-term, learning and teaching strategies. Additionally, findings suggested that CT is a newly-added requirement for the workplace and that HEIs and LMOs do not opt for the same terminology when referring to the concept –meaning that HEIs usually select scientific terms. Another element, which is evident is that CT in HEIs is commonly expressed through a declarative manner, while in LMOs application to specific cases follows the procedural manner.

Learning Scenarios

Regarding the second aim of this report, each team of HEI and LMO constructed two learning scenarios according to the findings, the sets of

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recommendations and the already identified educational needs. From the ten work-based scenarios developed, one from every discipline was organized in a syllabus form so that it can be further utilized for the CT blended apprenticeship curricula. This information highlights the importance of the scenarios, since they will set the stage for introducing CT at programme and course levels by utilizing Intellectual Output 3 activities to design work-based curricula for each country and dynamically enhance collaboration between HEIs and LMOs. Under this rationale, this scenario includes descriptive information about the themes, concepts, aims and learning outcomes, the duration, the teaching approach, the learning environment and the evaluation regarding both domain specific and CT related elements.

First Intellectual Output Impact

The current report is of major importance for the continuation of the THINK4JOBS project since it sets the stage for a sequence of activities carried out during the Second and Third Intellectual Outputs aiming at the successful application of the blended apprenticeships curricula. Besides the report's importance for the project continuation, it may also stand as a useful Toolkit for teachers, students and employers regarding the development of CT in the workplace. In general, according to research findings, HEIs and LMOs are differently goal-oriented regarding CT and the reason for this divergence lies in the very nature and general context of the two organizations. In other words, HEIs intend to prepare students for all jobs related to a domain, while LMOs aim at preparing an employee for a specific job in a specific organization. This conclusion seems to indicate a paradox: the two organizations work in parallel but they do not share common understanding. This is the reason why the First Intellectual Output may be an invaluable means in the exploration of CT

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through different perspectives; actively supporting HEI and LMO collaboration in the quest for common ground.

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Introduction

Critical thinking is a continuous concern of Higher Education Institutions (HEI). For the THINK4JOBS initiative, the partners have established a consortium formed by HEIs and labour market organizations (LMOs) in the attempt to improve learning and instruction of Critical Thinking (CT) skills and dispositions for students, namely future employees. Ten partners from five countries (Greece, Portugal, Lithuania, Germany, and Romania) accepted the challenge to create and develop innovative blended work-based apprenticeship curricula that nurture CT skills and dispositions.

The partners started from the presupposition that a way -beyond the state of the art- to improve CT instruction in HEI, is to create new curricula embedding CT and exploiting both HEIs and LMOs' teaching and learning experience and expertise. The new curricula will produce better and reciprocate knowledge transfer between HEIs and LMOs.

The current report presents the first Intellectual Output, *THINK4JOBS Toolkit*, comprising two parts. The first part is a qualitative empirical research aiming to map the differences as well as the gap between HEIs and LMOs concerning critical thinking development tactics. The second part is a collection of ten work-based learning scenarios, two for each domain covered by the project (teacher training, English as a foreign language – EFL, business economics, business informatics, and veterinary medicine). The toolkit intends to help partners with their next steps in designing a blended learning joint class between HEIs and LMOs.

The concept of "Toolkit" is rather vague in the literature and sometimes it is not clearly defined. Looking for definitions, we found that a "toolkit includes measures that describe classrooms broadly, that focus on different

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content areas, and still others that examine fine-grained details of teacher-child interaction. Different combinations of measures could be used for accountability and research (Dickinson, 2006). For other scholars, it is viewed as a "straightforward method of impact evaluation, easily replicable in different geographical contexts and equally applicable to […] diverse audiences" (Belfiore & Bennett, 2010; p. 122) or as "a collection of features" (Smock et al., 2011).

In the context of the Think4Jobs project, the Toolkit will be divided into two parts; the first part will provide a clear map on "how" CT is promoted currently in HEI and the labour market, with "what" means and "how it should be" promoted according to HEI instructors and labour market tutors. The second part will include work-based learning scenarios along with some initial recommendations on their exploitation in the apprenticeship curricula. The results from the qualitative research carried out for the first part of the current Intellectual Output revealed a learning requirement for the inclusion of more real-life cases and practical information during learning and instruction. Thus, we consider that the Toolkit is **"a collection of 'proto-components' (think of a physical toolkit approach). This builds upon the concept of "underdesign" where the user must modify the proto-design product to finish it"** (Sanders, 2006).

The learning scenarios will be "finished", in the sense of Sanders (2006), in the third and fourth Intellectual Outputs, where the curricula will be designed and evaluated. Thus, the collection of the scenarios included in the Toolkit will prove themselves useful in the design of the next Outputs.

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Part A. Literature review

The literature is generous if we refer to Higher Education – Labour Market partnerships. We find an abundance of themes and sectors where partnerships for research have been developed, but regarding partnerships for the improvement of CT, the examples are rare.

One of the most recent research projects was CRITHINKEDU – Critical thinking across European Higher Education Curricula (2016-1-PT01-KA203-022808), which mapped the needed 21st Century skills for successful jobs, turning to labour market as well as employers and asking how and what they think about CT (Domingues et al., 2018). The project aimed at improving, among others, the quality of learning in universities and across different sectors, which converge in a common need on how to better support the development of Critical Thinking (CT) according to labour market needs and social challenges. Some of the project's results indicate that employers argue in favor of developing a strong conceptual background in order to learn further, improve, and make critical decisions. Nevertheless, they refer not only to professional but to general knowledge and different kinds of literacy, as well. CT is nurtured at a personal level and during social interaction aiming at the best possible knowledge, informed decisions that consider the global benefit, as well as reasoned actions. Analysing the point of view of 189 European employers, CT is mainly recognized as: (1) the ability to avoid mistakes and make the right decisions; (2) the ability to correct and self-regulate; and (3) social responsibility. Thus, CT is appreciated not only to the extent that it contributes to professional success, but also to personal improvement and the common good (Penkauskienė, Railienė, & Cruz, 2019).

The analysis of the literature shows us that:

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- There is an interest in conducting studies and research on the skills required from young graduates in the labour market as well as in the direction of identifying ways to adapt academic programs so as to generate these skills for graduates (e.g., Clarke, 2018; Crossman & Clarke, 2010).

- The studies are focused on general topics such as: the set of skills required on the labour market for graduates (e.g., Clarke, 2018), classifying the importance of these skills, differentiating employers' expectations according to their activity sectors (e.g., Domingues et al., 2018), suggestions for adapting academic programs to employers' requirements, etc.

- CT is mentioned as part of the skills needed for graduates as well as young employees. Some scholars indicate that employers refer to CT directly, others list associated skills or descriptive features of critical thinking;

However, we have not identified academic programmes developed in partnership with LMOs aiming to develop CT skills or dispositions. Some studies show that the practice of training students' professional skills (e.g., apprenticeships, internships, placements, part-time work experience) enhances students' technical skills, employee identity, informed career decision making and fosters students' management of the transition from study to work (Gracia, 2010; Hoeckel, 2014; Kinasch, Crane, Judd, & Knight, 2016; Stiwne & Jungert, 2010). Clarke (2018) has highlighted the importance of apprenticeships and work-based experience of students, in employers' higher expectations of graduates in comparison to other categories of employees. In addition, she underlines that the latter benefit from

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apprenticeships as they demonstrate a high level of understanding of the environment in which they work and develop the ability to apply the information acquired during university studies in a practical way, which in return gives them a competitive advantage in the labour market. Further, apprenticeships as a form of mentoring have been identified as an effective strategy for promoting CT in students (Abrami, Bernard, Borokhovski, Waddington, Wade, & Persson, 2015).

Some authors show that internships are effective in skills transfer and proper integration into the labour market (Van den Brink et al., 2019). Thus, in order to provide “employed” graduates, students need to be well trained in the skills of the 21st century, and their development should be maintained and expanded (Habets et al., 2020). Moore and Morton (2017) analyze the connection between academic programs and the labour market. They highlight that internships ensure an insightful experience of the realities of organizations, especially in the context in which it is difficult to standardize the practices of institutions involved in the labour market as each organization has its own "culture", requirements and standards that graduates could learn most effectively through interaction and involvement within the company.

Studies conducted among employers in Romania show that they appreciate it when graduates present skills related to the attitudes of candidates, which must be proactive towards work, communication skills, teamwork, as well as digital skills. Among these skills are logical thinking, the ability to adapt quickly to change, the ability to make connections in understanding a context, a cultivated vocabulary, and a physical presence appropriate to the work environment (Stăiculescu et al., 2019).

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Concentrating on employers, we find that a significant disadvantage in the relationship between the university environment and the labour market is the fact that students do not develop during their studies a set of transversal skills that favour a rate of high employability. For a more efficient integration in the labour market, but also for easier mobility of people between employers, the development of certain transversal skills becomes elementary for graduates. Such skills are critical and analytical thinking, information synthesis, problem-solving, creativity, and innovation (Suarta et al., 2017).

The THINK4JOBS project has acknowledged this need, namely the development of CT skills and dispositions for improving graduates' employability in the labour market. In order to tackle this need, THINK4JOBS exploits apprenticeships as a field, where HEIs and LMOs can collaborate to revise and exploit them for the development of students' CT. Apprenticeships are considered an essential form of mentoring and a work-integrated learning interface developing graduates that adapt and apply theoretical knowledge in real-world learning contexts (Kinash et al., 2016). Additionally, apprenticeships can be seen as space, where by definition, HE and LM collaborate, although each party's role is usually rather vaguely defined.

To meet the aim of the project for the development of CT blended apprenticeships curricula, the Think4Jobs consortium exploits a Participatory Co-Design Approach (PC-D) (Robertson & Simonsen, 2013) engaging stakeholders in a Multi-disciplinary Partnership. Specifically, the Partnership has identified not only the end-users of the curricula, who will be benefited at the micro level (direct interest such as Higher Education students, but also the stakeholders who have an interest in the project at meso and macro levels (intermediate and indirect benefit), namely Higher Education instructors and Labour Market employers. PC-D is a process of investigating, understanding,

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and reflecting in order to design a product that will correspond to end-users needs. Thus, stakeholders and experts are engaged in mutual collaboration in order to establish, develop and support mutual learning to tackle the design of the product. Stakeholders engaged in the PC-D take the role of the end-users articulating the desired needs and requirements for the design, while experts guarantee that the design will correspond to the stakeholders' needs and 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, engaging in more specific tasks and activities such as design, evaluation, testing, piloting and refinement.

The current report aims, on the one hand, at mapping how CT is currently promoted in HEIs and LMOs apprenticeships, internships, or placements, identifying the points of mismatching (convergence and divergence) and, on the other hand, at suggesting work-based scenarios that could address the requirements regarding graduates' CT development as highlighted in the respective disciplines addressed by the Partnership. To meet this objective, we engaged stakeholders (i.e., Higher Education students and instructors, Labour Market tutors, employers, and employees) in the mapping procedure to obtain their insight on how CT is currently promoted in HEIs and LMOs and their wishes on how to achieve this during the design and development of the CT blended apprenticeships curricula.

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Part B. Mapping the gaps

Research methodology

In order to map the gaps between HEIs and LMOs concerning CT development, we propose hypothesis-driven research, tested by three research methods (observation, focus group, and documentary analysis), using three corresponding instruments (observational matrix, focus group rubric, and documentary analysis rubric). The general hypothesis states that there are differences between higher education institutions and labour market organizations regarding CT development.

The present research has an assumption, not to be tested, that differences are domain-specific. Therefore, we shall compare and highlight the supposed differences in five domains: veterinary medicine, teacher education, business and economics, EFL, and business informatics. The assumption comes from conclusions drawn in previous research developed in a previous project in which two partners participated – *CRITHINEDU* (Domingues 2018a, 2018b, 2018c, Elen et al. 2019). Selected domains are situational, representing the disciplines of the partners involved in the THINK4JOBS project.

The (action concerning) development of CT is operationalized by several variables, divided into three categories:

I. Pedagogical aspects of CT development

1. *Class/course objectives concerning CT*
2. *Critical thinking teaching strategies*
3. *Critical thinking teaching methods*
4. *CT evaluation approaches*

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5. *Tools and materials reflecting CT*

II. CT aspects

6. *Critical thinking explicit reference during instruction (including partial references)*
7. *Model of a good critical thinker*
8. *Triggering improvement in critical thinking*
9. *Nurturing CT by referring real labour market cases*

III. Implementation of CT

10. *Presence of CT*

We are aiming to respond to the following research questions for a complete and thorough analysis of the current situation of CT development.

1. *Is there an observable difference in class/course objectives concerning CT between classes/courses offered by HEIs and LMOs?*
2. *Is there an observable difference concerning CT explicit reference during instruction (including partial references) between classes/courses offered by HEIs and LMOs?*
3. *Is there an observable difference in providing a model of a good critical thinker between classes/courses offered by HEIs and LMOs?*
4. *Is there an observable difference in triggering an improvement in students' CT between classes/courses offered by HEIs and LMOs?*
5. *Is there an observable difference in nurturing CT by referring to real labour market cases between classes/courses offered by HEIs and LMOs?*

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6. *Is there an observable difference in CT teaching strategies between classes/courses offered by HEIs and LMOs?*
7. *Is there an observable difference in CT teaching methods between classes/courses offered by HEIs and LMOs?*
8. *Is there an observable difference in tools and materials reflecting CT between classes/courses offered by HEIs and LMOs?*
9. *Is there an observable difference in evaluation approaches of CT between classes/courses offered by HEIs and LMOs?*
10. *Is there an observable difference regarding the presence of CT (discipline-depended) between classes/courses offered by HEIs and LMOs?*

For each variable, a sum of indicators was developed to help construct the research instruments (the observational matrix, the rubric for focus groups, and for documentary analysis). We used well-established theories and well-known authors from both CT theory and pedagogical theory and practice. The indicators for each variable are as follows:

1. For the variable c*lass/course objectives concerning CT* we employed the most used types of aims in pedagogical practice, and all could accommodate CT as an outcome: operational objectives concerning CT, learning outcomes/results concerning CT, Competencies concerning CT, Intellectual values concerning CT, Intellectual attitudes concerning CT.
2. *Critical thinking explicit reference during instruction (including partial references)* was operationalized through Facione's framework (1990), employed also in CRITHINKEDU (2016-2019) project. It consists of two-fold entities, a set of dispositions and a set of skills. The set of skills are: Interpretation, Analysis, Inference, Evaluation, Explanation, Self-

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regulation. The set of dispositions consists of a set of attitudes, namely: Truth-seeking, Open-mindedness, Analyticity, Systematicity, Self-confidence, Inquisitiveness, Cognitive maturity.

3. The variable *model of a good critical thinker* is operationalised through a collection of behaviours described in previous work in the CRITHINKEDU project (Elen et al. 2019) and it comprises: a) course reflection of different (opposing) perspectives; b) the teaching program revealing the complexities of the discipline/the field it represents; c) the teacher offering ill-structured problems; d) the teacher addressing multiple sites of a problem, weighing alternatives, engaging in critical discourse and conversation values; e) different approaches promoting innovative thinking (creativity).
4. *Triggering improvement in critical thinking* is based on the work of Paul and Elder (2008; 2006) and it refers to the intellectual standards created by the two authors: clarity, accuracy, precision, relevance, depth, breadth, logic, significance, fairness.
5. The variable *nurturing CT by referring to real labour market cases from specific domains* is based on authentic situations analysis. According to Abrami and colleagues (2015), authentic situations analysis can be considered a teaching strategy, thus, it was included in the variable as an indicator.
6. *Critical thinking teaching strategies* are operationalized as follows: infusion, immersion, general/stand-alone approach, mix approach (Ennis, 1989), behavioral approach, cognitive/rational, mentoring, self-study (Jinga & Diaconu, 2004), social interaction (Schreiber & Valle, 2013), personal (Rogers, 2012).

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7. For *critical thinking teaching methods/CT-related methods,* we chose a list of methods, some well-known, classics, some newer, but all are effective for CT nurturing (Jinga & Diaconu, 2004; "Thinking as a Skill | de Bono" n.d.). Additionally, we listed other methods known to be complex but which foster CT (e.g., peer teaching, fishbowl, Jigsaw, The snowball, The starburst).
8. *Tools and materials reflecting CT*: For this variable, we operationalised through the following indicators: the class syllabi, the training programmes, the handouts, the recommended textbooks, the recommended readings, the assessment tools, the apprenticeships documentation, the assessment rubrics, the recruitment policy guidelines (for LMOs).
9. Evaluation approaches. First and foremost, we wished to see if CT is a condition for class graduation. Next, we listed methods of evaluation (Jinga & Diaconu, 2004) such as Oral, Written, Project-based, Practical assessment (i.e., assess someone when implements in practice what was learned), Instruments and tests (e.g., Papers/Argumentative essays, Open-ended Questionnaires, Close-ended Questionnaires Standardized CT tests, Skills assessment, Open-Book exams).
10. Variable *Presence of CT (discipline-depended)* was operationalized by referring to the previous work of the CRITHINKEDU project (Elen et al., 2019) and resulted in the indicators:
    - institutional level (domain-depended for LMO)
    - programme level (domain-depended for LMO)
    - course level (domain-depended for LMO).

    The indicators highlight the importance of CT to be identified and promoted through these three levels in order to be developed.

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Data collection instruments

The consortium agreed from the start when preparing the application, based on previous experience from the CRITHINKEDU project, that the data will be collected through three qualitative methods, namely observation, focus group discussions, and documentary analysis. Thus, we developed three instruments through which we collected and interpreted the primary data.

An **observational matrix** was developed, containing a rubric listing all the variables and indicators. Each indicator had a frequency scale and additional space, in which the researcher provided a concrete example of the realisation of the indicators as seen in practice. At least three apprenticeships (or courses) were observed, with at least 4 observation sessions for each; both HEI and LMO had the same number of observations. Partners were keeping their specific domains. There were at least 2 observers present to ensure inter-rater reliability. Only CT-related behaviours and actions were recorded in the matrix. Primarily real-time courses were observed, but in some cases, pre-recorded courses were also considered eligible. In all cases, consent was granted by participants, both instructors, and students, in order for the collected data to be analysed. A different procedure was followed in the case of the German HEI, where HE instructors were hesitant to participate in observation sessions and they did not consent in advance to any data analysis that would result from observations. To mitigate this risk, the observational matrix was exploited as a rubric for a guided interview with the teachers. Consent to analyse the data from the interviews was provided in advance.

The second method employed was **Focus Group discussions**. The instrument comprised four-question **sheets** for HEIs' teachers, LMOs' trainers,

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students, and employers. The researchers had to fill in a rubric containing all the variables and indicators, giving quotes from the participants. HEIs implemented two focus groups, one with teachers and another one with students completing two rubrics. In some cases, LMOs were not familiar with the data collection methodology (i.e., focus group discussions). Therefore, it was deemed appropriate for the HEIs to collaborate with the LMOs to scaffold, support, or implement the data collection procedure. The LMOs implemented two focus groups, one with trainers and another one with employees.

The third method was the **documentary analysis**. The instrument exploited was once again **a rubric** containing all the variables and indicators, as described in the previous section. The researchers gave concrete examples regarding if /when they identified the indicators in the respective documents exploited in each course both at HEIs and at LMOs.

Participants and procedure

Data collection took place during the winter semester 2020-2021, in all partner countries. In total, 134 participants (HEIs teachers=35, students=36, LMOs trainers=28, employees=35) were engaged in the focus group discussions across the five countries. Participants were selected and recruited purposefully.

Results and Discussion

The pool of data gathered and analysed for the purpose of the first Intellectual Output revealed an interesting finding, namely that there is no definitive “a gap” between HEIs and LMOs. However, there is a different context. The university has a different purpose, meaning that the learning activities are

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aiming in a different direction in comparison to the LMOs. University provides initial education and career preparation. It sets long-term goals, and it needs years to attain them. LMOs have short-term teaching and learning strategy, aiming at narrowing competencies, needed for specific work tasks and organisational adaptation. Tholen (2019) resulted in similar findings suggesting that precaution is required when skill demands for graduates' employability in the labour market are associated with the skills developed at the university. Moreover, Succi and Canovi (2020) underline that there is a consensus between Higher Education and Industry regarding the importance of soft skills for graduates' employability. Still, **they seem to operate in parallel without sharing a common understanding of expectancies or perceptions on the issue**.

Another interesting finding was that CT is considered a recent requirement for acquisition in the educational landscape. Thus, it is perceived that more time is required in order for CT to be embedded successfully into HEIs curricula.

Unsurprisingly, it was identified that there is a difference in the language used by the HEIs and LMOs when referring to CT. Specifically, it was apparent that in the context of HEIs, scientific terminology related to CT was more frequently exploited in comparison to the context of LMOs. However, it is crucial to underline that this finding does not imply that CT is less present in LMOs' environment. On the contrary, it is assumed that LMOs are less familiar with the scientific framework of CT and it is not among their priorities to achieve a conceptual understanding of the CT concept, rather they are more interested in exploiting and promoting CT in action to their apprentices or employees. Further, it could be assumed that in their effort to train their

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employees in developing various soft skills, CT does not stand out in the training process.

Also, it is evident that CT in HEIs is more visible in a declarative manner, while in the context of LMOs, CT is exploited in a procedural manner as it applied to specific concrete cases. This can be associated with the level of awareness that HEI and LMOs ascribe to the concept of CT. On the one hand, it can be assumed that HEIs are aware of the concept of CT and of ways to promote it in learning and instruction. Thus, they engage in such practices more often and usually more explicitly. On the other hand, LMOs have a less conceptual understanding of the CT concept, *per se*, and therefore, they promote it more implicitly.

In the following sections, we shall present how CT is promoted in each of the five disciplines addressed by the partners in the THINK4JOBS Partnership. The results are the effect of the triangulation of the three methods employed and they represent “how” CT is promoted in HEI and LMO and with “what” means. The second part of the Toolkit will focus on the presentation of the learning scenarios as a joint effort of HEIs and LMO classes, thus presenting “how CT should be promoted”.

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Results triangulation of critical thinking for Primary Teacher Education domain

The triangulation of the results from the observation, focus groups with teachers, trainers, students, and employees, and documentary analysis were set to answer the research questions (see Research Methodology Section). Data analysis presents the differences between teacher education at the tertiary and primary levels of education for each one of the variables. The HEI engaged in the study was the University of Western Macedonia and the LMO was the Primary Experimental School of Florina in Greece.

There is **no perceived difference** between HEI and LMO concerning **class objectives**, and **critical thinking direct and indirect reference** during classes. However, HEI is more interested in promoting dispositions in comparison to LMO. This could be attributed to a lack of previous conceptual knowledge regarding CT dispositions or a lack of procedural knowledge on how to promote CT dispositions during everyday praxis.

> "*It is important not to rely on given academic knowledge but having the skills to question, adjust in new situations and find solutions to work with problems that you are going to have".* (Teacher, HE, University of Western Macedonia, Greece)

> *"When dealing with an incident in our class such as a violent outbreak or an argument, teachers should filter information, be in contact with children, their parents as well as colleagues."* (Trainer, LMO, Experimental School in Florina, Greece)

Concerning offering a **model of a critical thinker**, findings show that both HE and primary education courses provide most of the elements of a model of a good critical thinker (reflection of different perspectives; offering ill-structured problems; engaging in critical discourse; promoting innovative thinking; weighing alternatives and valuing different approaches). But there **is**

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an observable difference in the frequency of mentioning or the frequency of observation since in HE courses the elements of revealing the complexities of the discipline and addressing multiple sites of a problem are also included.

Additionally, it could be argued that the model of a good critical thinker with its indicators is more frequently observed in Higher Education rather than in LMO. This is probably the case since HE offers courses that may stand as a threshold for students' professional careers.

> *''When a problem is ill-structured, you should evaluate and be creative in order to find a solution, for example in ill-structured design problems".* (Teacher, HE, University of Western Macedonia, Greece)

> *"We engage in critical literacy with my students at the after-school club and we approach various types of texts employing the critical analysis approach aiming to create a metalanguage and identify the social and cultural power of texts".* (Teacher/ employee, LMO, Experimental School in Florina, Greece)

According to the findings, intellectual standards that demonstrate improvement elements triggering CT such as *precision, clarity, relevance, breadth, and logic* are **reported by observation in classes offered by HE**. Regarding **LMO**, *clarity, precision, relevance, depth and significance* were also traced **during class observation**. Thus, there is a rather small observable difference which may be attributed to the different design and orchestration of the teaching process between university and LMO education classes. In detail, pupils in LMO mostly get acquainted with new content knowledge and tend to realize its significance while different and more meticulous approaches are activated at a university level.

Nurturing CT by referring to real labour market cases between classes/courses variable brings a counterintuitive finding, although we can

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respond affirmatively to the research question that asks if there is a difference between HE and LMO concerning this variable. It was more frequently registered in HE, throughout observation and FG discussions. On the one hand, this reveals that it is more applicable and useful to refer to real labour market cases at the tertiary level of education as it is closely related to the labour market. On the other hand, although the variable was observed in Higher Education, the frequency was not quite high. Still, the FGs discussions revealed that HE instructors considered the exploitation of labour market cases valuable for students' training and practicum.

> *"I try to give students rational statements that lead to irrational judgments in order for them to understand why sometimes we should be careful during the thinking process".* (Teacher, HE, University of Western Macedonia, Greece)

With respect to the **critical thinking teaching strategies, no difference was observed**. In all cases, HE and LMO alike, **immersion** was favoured for the promotion of CT. Only one mention of the infusion approach was registered, by one HE instructor. This difference, although not found systematically, could be attributed to the instructor's previous knowledge and experience with CT theory. Similar is the situation with the teaching models exploited by the instructors in both levels of education. More frequently the **behavioural and cognitive/rational models were exploited**. However, in primary education (LMO), in one course, the teacher frequently combined the cognitive rational model along with components of the social interaction model. This difference might be attributed to the fact that the courses in primary education were held in person, despite Covid-19, allowing students' collaboration and cooperation in specific tasks in comparison to the online courses offered in HE.

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According to findings, both instructors in HE as well as in labour market courses use a variety of teaching methods in order to promote CT. Active lecturing, metacognitive strategies, project-based teaching, problem-based teaching, peer teaching, case study teaching, hands-on learning, cooperative learning, role-playing/ dramatization, dilemmas, debate, analogies, and Socratic dialog are the teaching methods that were mentioned both for HE as well as for labour market courses/classes. Nonetheless, there were also differences regarding the teaching methods exploited in HEI and LMO. Regarding courses in HE, six thinking hats and online forums were also mentioned. Concerning online forums, the finding might be related to the exceptional circumstances during the Covid-19 pandemic and the obligatory transition of HE to synchronous online learning and instruction. Regarding six thinking hats, the reference to the specific method might be related to the academic teachers' expertise in teaching methodology. In contrast, experiential learning, brainstorming, Gallery tour, concept mapping, gamification, and lecturing with an opponent were teaching methods related to labour market classes/ courses**. One could argue that the difference and the variety of methods that were mentioned about labour market classes relate to the teaching profession, the younger students' learning needs as well as the possibilities of the exploitation of different approaches for learning and instruction offered across the curriculum.** Thus, we can conclude that the differences are initiated by the current situation created by the pandemic, but otherwise, both HE and LMO, due to their domain (teacher education) are motivated to use an array of methods, rich and diverse, thus, leading to little differences between them.

Regarding **tools and materials reflecting CT,** the only observable difference is that **in HE**, class syllabi, recommended textbooks, and some

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assessment tools (including practicum assessment tools) **reflect CT**. Although the importance of CT is widely recognized and promoted by the labour market's policies, the courses offered by the LMO may not focus on CT explicitly, rather on content-related knowledge and at the same time, they implicitly refer to some CT skills. Thus, **the reference of CT in syllabi, textbooks, or assessment tools is absent in LMO.**

In HE courses, **evaluation approaches** mainly focus on written methods through papers, open-ended questions during exams, written exams, or open answer sheets. Additionally, students are evaluated for CT during their practicum.

> "*I try to give students the opportunity to think critically.*" (Teacher, HE, University of Western Macedonia, Greece)

> "*The acquisition of CT skills can only be assessed during practicum.*" (Teacher, HE, University of Western Macedonia, Greece)

Regarding LMO courses, evaluation in primary education employs observation of CT elements in pupils' answers, open-answer sheets, and multiple-choice tests that require CT for successful answers. Thus, it is noted that a combination of oral, written, project-based, and practical assessment approaches is utilized. The observed differences in comparison to HE could be attributed to the pupils' number in the classroom, which is significantly reduced therefore interaction between teachers and pupils is promoted. Another reason for the arising differences is the age difference between primary education pupils and students, which would support less written-based forms of assessment.

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Regarding the last variable, the **presence of CT** between classes/courses offered by higher education institutions and labour market organizations, the analyses revealed **small differences** between Higher Education and Labour Market Organizations. In particular, regarding the presence of CT at an institutional level, it was revealed that in LMO there is no explicit mention at an institutional level regarding the presence of CT. Although in HE there was one reference, the mention is not in line with how "presence of CT at an institutional level" was conceptualized in the CRITHINKEDU project (i.e., explicit clarification, no accreditation if CT is not accomplished by the students) (Elen et al., 2019).

In addition, we can mention that some aspects that the framework did not capture were concerning CT and its implementation and promotion through the apprenticeships. The analyses revealed that, according to LMO stakeholders, **CT cannot be promoted successfully with the current format of apprenticeships in the field of teacher education.** Further, it should be mentioned that stakeholders from HE also recognised that there is a need for students to be trained with ill-structured problems that would appear in random and sudden moments during a course as it would actually happen in reality. Moreover, LMOs highlighted the need to train student-teachers in aspects such as class management, communication with colleagues and parents as well as in the overall reality, culture, and administrative routines that apply in a school besides pedagogical content knowledge.

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Results triangulation of critical thinking for English as a Foreign Language (EFL) domain

Partners that completed the research, Vilnius University (HE) and Public Service Language Centre (LMO) have gathered the information through observation, focus groups, and documentary analysis. We shall answer the research questions, trying to identify the differences between HE and LMO regarding the development of CT in EFL.

It should be noted that the assessment of the difference between what was taught and learned at the university and the labour market by the trainees is very specific because a number of them completed their studies before the breakup of the Soviet Union when the educational system and the labour market were based on different ideologies and principles. The education and training they received could not, therefore, correspond to the changing labour market based on a free market economy that was gradually, and in some areas not so gradually, introduced in the 1990s. There is also a considerable difference between those who have studied at different universities in Lithuania because the methods seem to have considerably differed. The Pedagogical University of Vilnius, later renamed Lithuanian Educational University and now extinct, apparently did not encourage CT as much as Vilnius University did, according to some trainees. The reason for this conclusion might lie in the different quality of teaching, or just particular inherited practices, but they could also be based on subjective impressions. The changes were mostly gradual, though, and teachers had time to adapt, learn new techniques, and realize the importance of CT in higher education.

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Regarding **class/course objectives concerning CT** the main observable **difference** lies in the form of the **presentation of the classes**: in the case **of HEI, the classes are student-centred, while in the case of LMO they are all lecturer-centred**. Thus, the level of active participants' engagement that is crucial in CT development, and what kind of objectives are offered is completely different. In the case of HEI, the students immediately demonstrate how they apply CT skills and how they try to reach the objectives, while in the LMO they are all tentative, as the listeners are only the recipients of the provided information but not active doers.

From the teachers' perspective, CT skills are part of the courses offered, although they are not mentioned explicitly. On the other hand, some trainers say that CT objectives need to be cultivated by bypassing the rigid academic framework. Thus, they criticize the traditionalist paradigm under which higher education institutions still function. A discrepancy is observed; while teachers identify CT in the curricula, some trainers identify a gap that needs to be filled. The objectives of the courses offered by the university and the teacher training institution are composed in many ways similarly, except that the objectives concerning CT at the university are usually spelled out more specifically. They mention CT more explicitly. Whether they abide by the objectives is another question. From the higher education institution perspective, CT skills come as a competence that students would develop during the course. And those CT skills are mentioned explicitly in course descriptions, as well as others which also can be assumed as CT skills components.

Regarding the variable of **Critical thinking as an explicit reference during instruction,** in both cases (HE and LMO), **the explicit reference to CT is not as obvious, though in HEI it is more common.** There were a few instances in HEI when the teachers explicitly mentioned CT, while in the LMO there were

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none during the instruction. Generally, both teachers and trainers speak about a need for more explicit references to CT. Since VU courses follow the task-based approach, implementing activities like debates, conferences, case studies, etc., there are moments and scenarios where CT skills are explicitly mentioned. Trainers, on the other hand, have fewer opportunities to mention CT explicitly. They incorporate CT tasks into their activities. There is not that much difference between the perception of CT between university students and the labour market trainees. Both students and trainees think that critical thinking is one of the most important parts of the training of future professionals in most disciplines. While students think that subjectivity is needed to formally assess CT, the trainees, as experienced teachers, are familiar with all the techniques that stimulate CT. Maybe some of them haven't thought explicitly about some techniques as CT-focused, but they are aware of the importance of CT well enough to be able to immediately identify them and describe how they contribute to developing CT.

Concerning the variable **model of a good critical thinker,** we found there is an observable difference in providing a model of a good critical thinker offered by HEI, as most of the classes are based on the practical implementation of CT skills during their activities. The students are actively engaged in CT through a set of well-organized activities that have a clear structure and a well-defined outcome, e.g., their own presented reasoning line in the debate activity, their own created solution to the pressing issue in the case study, their own analysis of the polarity of views in the moral dilemma discussion, etc. By contrast, in LMO the listeners are not actively engaged in terms of action, they are more in the role of listeners. Thus, it is unclear whether they are able to practically apply those recommendations provided by the instructor. Also, in HEI there is a lot of teamwork, which is another essential

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skill for the development of CT, while in LMO there is more focus on individual and autonomous learning.

The differences between the two focus groups with teachers are subtle, almost unnoticeable. For both teachers and trainers, the **model of a good critical thinker revolves around problem-solving**, the habit of analysing subjects from a different perspective, and flexibility in tackling problems. Nevertheless, teachers are also concerned with what Facione (1990) defines as self-regulation, the ability to identify and correct one's own mistakes based on reason, deduction, and logic. For the trainers, a good critical thinker is oriented more towards the others.

In the focus group with students, no one really mentions this, but members of both focus groups (with students and with trainees) imply that the examples are given by instructors themselves and exemplified by their ability to stimulate critical thinking in students. This is partly observable in the documentary analysis. One can assume that an HEI considers students as good critical thinkers if they understand and critically evaluate authentic research articles and popular scientific media sources, convey information by formulating problems, present different views and arguments, who can represent themselves in a debate, and who also has problem-solving skills, while LMO gives more credit to the practical aspect of knowledge and its use.

There is a clear difference in triggering an improvement in students CT between HEI and LMO. In HEI, students are encouraged to immediately reflect on their progress at the end of the class and sometimes during the instruction, also students must submit a research-based essay as a part of their university class. By comparison, in LMO the instructor only encourages one's

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listeners to use a variety of testing tools, however, how this variety can be combined and practically implemented remains unclear.

From the teachers' perspective, CT skills are part of the courses offered, although they are not mentioned explicitly. On the other hand, some trainers say that CT objectives need to be cultivated by bypassing the rigid academic framework. Thus, they criticise the traditionalist paradigm under which higher education institutions still function. **Hence, a discrepancy is observed; while teachers identify CT in the curricula, some trainers identify a gap that needs to be filled. Both teachers and trainers speak about authentic literature's importance in triggering improvements in students' critical thinking.** Despite that, the focus group for teachers reveals a broader understanding of "authentic literature". Teachers include here various texts from research articles to essays or even fiction. Trainers are more inclined to use less theoretical texts suitable for solving practical problems that might appear in everyday life. The difference follows the general tendency; the labour market narrows down CT to make it practical while teachers manifest a propensity for theory.

Students think that CT is encouraged at university, but they are not aware that it is specifically mentioned. Trainees, on the other hand, consciously use CT in their daily work while emphasizing self-evaluation, identification, research, and pointing out prejudices, for example. They also look for materials that would trigger discussions, expression of personal opinions, and questioning different views.

This is also partly observable in documental analysis. It can be understood that in HEI, students are encouraged to reflect more on their progress during classes, also students are always encouraged to participate in

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debates, discussions, etc. Thus, during the activities and feedback from the teacher the CT improvement can be achieved. Still, the documental analysis did not indicate clearly how CT improvement is achieved in the LMO.

Both in HE and LMO, there is an ongoing reference to one's future or current profession of being a teacher. Nonetheless, it could be argued **that it is more CT nurturing by referring to real labour market cases in HE** (the fifth variable), as the profession of the teacher is always analysed in a wider social context, which is more beneficial for the students and for their professional vision in the long term. By contrast, **in LMO** it is only **teacher-focused** and teaching-in-the-classroom-focused, **there is no wider application** of real labour market cases and social extension of the professional domain to other areas.

The researchers believe that students have not had relevant enough jobs in order to assess their needed level of CT skills for a successful job. And most of them haven't had jobs for which CT is highly significant.

Concerning **critical thinking teaching strategies,** there is an observable difference in terms of very specific and well-structured activities that are offered by **HEI** such as **debate, moral dilemma discussion, story-telling, integration of visual arts, team projects,** etc. All these activities have a clearly defined structure and sequence based on the development of CT skills such as building an argument, using an analogy, developing a reasoning line, providing specific evidence, defining the status quo, as well as overviewing the key concepts by using a variety of sources. In the case of LMO, the activities are of a more generalised nature, where the specific structure and the sequence line are not presented. The **labour market** prefers to mainly use **various forms of Socratic dialogue and brainstorming to trigger improvements in students'**

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critical thinking. Teachers favour teamwork and use the Socratic dialogue as an adjacent element rather than the main one. This would be hard to deduct with students and trainees, because CT is only part of the task for both institutions, albeit a very important one, but it is not part of any higher strategy. That would require refocusing the entire teaching process solely toward CT. Furthermore, **HEI uses other strategies such as case studies, the task-based approach, debates, conferences, self-reflection, peer review, writing assignments, discussions, team projects**. Those are very specific activities that are mentioned in HEI course descriptions and those activities help to develop students' CT skills. Looking through LMO teaching programs one can see that CT teaching methods are incorporated in the teaching process, albeit not distinctively mentioned.

Most of the **CT teaching methods in HEI focus on teamwork**, while in the case of LMO the independent and autonomous learning is emphasized. The **teaching methods** developed by the HEI encourage the development of **general skills**, as defined by course descriptions and curricula. Receptive, productive, interactive, and mediation skills are equally covered. For the LMO, teaching strategies are oriented towards specific competencies. After analysing the focus group with trainers, they favour interactive and mediation skills, mainly associated with CT.

In the case of **tools and materials reflecting CT** an observable difference was identified, namely, in HEI most of the tools and materials are created by the teachers themselves so that students' needs can be approached from a personalised perspective, while in LMO a ready-made toolkit is offered. Although both the HEI and the LMO stress the importance of authentic literature in developing CT skills, the approach seems different. LMO Trainers prefer to use authentic literature as an educational tool for problem-solving

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tasks. The HEI includes scientific research articles in the category of authentic literature, which become part of various activities such as case studies, debates, research proposals, etc.

Judging by some of the answers, in the teacher's training institution the tools and materials are more readily taught and available, because they teach how to teach, whereas this could only be applied to pedagogy courses at the university. Some university instructors consciously use tools and materials reflecting CT, but usually, they are more focused on conveying the class material, and sometimes their tools indirectly stimulate critical thinking in students. In the labour market institution, this goal is very concrete, and at the university, the entire process is supposed to help students use CT, more by using indirect methods.

There are no tools and materials specifically reflecting CT neither in HEI nor in LMO documents. It could be argued that in **HEI evaluation approach is more content-based**, i.e., there is more focus on how the content is created by the students themselves, and how they are able to use their CT skills to make this content of high quality in terms of using the context for analysis, interpreting the data, drawing conclusions. In LMO, there is more focus on the testing of pre-made questions that have preselected answer options. Testing as such would undermine the creativity factor, which was highly emphasized by LMO.

There is a consensus about the difficulties of assessing CT. The labour market does not discuss the possibility of evaluating CT separately. The trainers describe CT's assessment tools as part of the general evaluation. At the higher education institution level, there is a debate about the need to evaluate CT independently. Both parties are aware of the important degree of subjectivity

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involved in assessing CT. **There is no specific mention of evaluation approaches of CT neither in HEI course descriptions nor in LMO programmes.**

For the last variable, regarding the **presence of CT**, it could be maintained that in HEI there is more presence of discipline-related CT. By comparison, in LMO there is more emphasis on the generalised mode of teaching and its effectiveness. The HEI offers courses where CT is explicitly mentioned in the course description. Each case should be studied separately, but from the answers to the questions, it could be concluded that there is no marked difference between the students and trainees regarding this question. More or less, all members of the two focus groups are aware of the importance of CT in education. Whereas trainees have to use these skills to teach, students have to apply them in a different situation, depending on their future career, which is not always directly related to what they have studied. The CT mechanisms have to be applied in most jobs, and they are sometimes not overly explicit. CT also involves social and communication skills, which are not taught anywhere, but students acquire this only by being in a collective and having constant interaction with their peers.

From the documental observation point of view, one can see that HEI is more in the presence of critical thinking skills in courses. Critical thinking skills are specifically mentioned in the course descriptions, what is more, teaching methods and strategies involving critical thinking are distinctly described in HEI course descriptions.

Apart from the research questions, the researchers noted the following: some notable differences could be more explicit if the observation of HEI and LMO would follow the same categorization pattern. In HEI, practical

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tutorials were observed where the number of students would not exceed 16. In LMO, these were lectures that were delivered to a group of 30 teachers, who were in the role of passive listeners rather than active participants or so-called doers. Also, the focus student group in HEI is very specific, and there are specific aims to be achieved that are very context-related and also more personalised and individualised. By contrast, in the case of LMO, the aims are very generalised, and the audience is very varied with different aims that are not necessarily to be achieved during the delivered lectures.

Results triangulation of critical thinking for Business and Economics

Partners that completed the research, Academia de Studii Economice din București (HE) and BRD – Groupe Societe Generale (LMO) have gathered the information through observation, focus groups, and documentary analysis. We shall answer the research questions, trying to identify the differences between HE and LMO regarding the development of CT in EFL.

At the beginning of the research, we assumed that there are differences between HEI and LMO concerning CT and there were expectations that LMO is more dynamic and flexible tackling the tough mission to nurture CT. The results showed, in this case, that the expectations were confirmed. HEI focuses on the interpretative and analytic aspects of CT, while LMO focuses also on dispositions, enhancing skills like responsibility, awareness, identification, and analysis, interpretation, self-learning. But both ASE and BRD, are addressing CT indirectly, through an implicit teaching approach.

Concerning **class objectives,** analysing the results between HEI and LMO we observed that there are direct and indirect mentions in HEI classes, on

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all aspects implied by the variable indicators (operational objectives concerning CT, learning outcomes/results concerning CT, competencies concerning CT, intellectual values concerning CT, intellectual attitudes concerning CT).

HEI entails behavioural and cognitive **teaching approaches**, top-down, concept driven teaching strategies. LMO delivers the information in a detailed and progressive way, bottom-up strategy, in order to ensure that the trainees acquire the know-how and make the transfer in the practice. For example, LMO uses evaluation techniques to analyse the level of understanding, so that they can rearrange the teaching techniques for the participants to correct any errors.

The difference between HEI and LMO concerning CT explicit mentioning during instruction comes to **dispositions**. LMO has a definitive advantage, as more mentions and observed actions related to CT dispositions were identified.

> "*The capacity to be 100% sincere with yourself, to accept the possibility of mistake, value yourself, ask and offer feedback to generate value. To transfer yourself from thinking subjectively to objectively and accept different perceptions, even if they are in opposition to what you consider*". (Trainer, LMO, BRD – Groupe Societe Generale, Romania)

Another difference between HEI and LMO concerns the variable **model of a critical thinker**. Both the focus group discussions and the observation sessions revealed that the LMO referred to all indicators of the specific variable. While **the LMO has a better grasp on offering a model of a good critical thinker, HEI ismodest on this point.**

> *"I use the method of offering little information about a study case to the group, leave each participant to reflect and then he facilitates the debate in which participants discover different context that can emerge,*

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the importance of trying to find the reason and the correct need of your client behind the first impression, experience different questioning techniques, identifying the why's, taking notes, reformulations – so that you can assure that you truly understand what your client needs. Then we do role plays and games to understand how important our role in the relationship with our clients is". (Trainer, LMO, BRD – Groupe Societe Generale, Romania)

Regarding the **triggering improvement in CT techniques**, the main differences observed are in the limited diversity of the teaching approach. To trigger a participant into developing involvement in CT, the first need is to involve them actively, to create interest and curiosity in the subject that the trainer has to deliver. To accomplish this need, LMO goes beyond presentations (usually the presentations have representative images/videos with little to no text). The trainer starts with general information and gradually increases the level of accuracy, to maintain active attention and understanding. In this process, diverse methods are used (training app programs – hands-on experience, study cases, debates, storytelling, etc.). The participants understand the "why" and "how" in their activity, thus they can concentrate on the big picture and connect the dots in different cases, instead of focusing firstly on the "what". HEI doesn't trigger actual improvement (intellectual standards), with only one mention in the focus group discussion with teachers, and no mention in discussion with students.

For the variable **nurturing CT by referring to real labour market cases,** LMO uses various methods of delivering information –such as practical exercises in a training platform, e-learning games, study cases - combining theoretical, soft, and practical knowledge, role plays, storytelling. Therefore, participants experience different ways of learning and the trainer has the responsibility to guide the participant into discovering the results, instead of simply presenting the information. HEI teachers also declare that they use real-

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life cases in their classes, but students say that they do not get much grasp on the real-life, work situations, an argument confirmed by the observation of the classes.

> *"The course addresses the participants in an experiential way, having numerous case studies specific to the field (analysis of the economic-financial situations of the companies), on different categories of clients, with different activities, in order to have a more complete understanding and to generate different decisions".* (Observation of the training class *Profit or Loss in the company's accounting* in BRD – Groupe Societe Generale, Romania)

Regarding the **teaching strategies**, the main differences observed are in the limited diversity of the teaching approach. To naturally determine a participant into developing involvement in class, the first need is to involve them actively, to create interest and curiosity in the subject that the trainer has to deliver. Also, LMO uses blended learning – the theoretical information is usually integrated into e-learning sessions, tutorials, and guides that can be accessed by the participants in their own time so that in class (face-to-face/virtual) the participants and trainer can focus on the development of practical experience. Shortly, the teaching scenario consists of practical examples, followed by the trainees' experience and by understanding the involved theories.

In HEI the data is consistent throughout observation and focus group discussions, the preferred strategy for CT is immersion, while teachers do not make CT explicitly and students do not identify CT strategies. However, the rational-cognitive strategy is next, followed by social interaction, which shows that CT can be nurtured with proper training for the teaching staff and it also means that LMO can help HEI improve their teaching strategies.

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Regarding the **teaching methods**, the main differences observed are similar to the strategies and triggering methods – basically in the limited diversity of the teaching approach for HEI. To naturally determine a participant into developing involvement in class, the first need is to involve them actively, to create interest and curiosity in the subject that the trainer has to deliver.

Both HEI and LMO use various **tools and materials**. The difference is in the tools and the types of materials. For example, HEI uses extensive handouts, textbooks, and recommended bibliography. LMO also uses handouts and textbooks, plus digital platforms where the participants can access information in a dynamic way (e-learning sessions/games, tutorials, online assessment tools). Lately, due to the pandemic, HE have moved classes online, thus they are using an online platform for blended learning.

CT is an indirect factor in **evaluation approaches** (the ninth variable). At HEI there is little data to analyse. It mentions argumentative essays and observation as a method to assess CT. Observation is the preferred evaluation approach in HEI. On the contrary, LMO uses diverse evaluation approaches – from recapitulations as intermediary assessment to oral (debates, role plays) and online evaluations. Still, neither HEI nor LMO have CT as a condition for class graduation.

> *"We have online assessments in a practical way (they have access to a training platform program in which they have to search info to respond correctly)". (Trainer, LMO, BRD – Groupe Societe Generale, Romania)*

Regarding the last variable of the research framework, **the presence of CT**, we have found that CT is an indirect skill involved in the LMO training sessions. For LMO, all professional activities are based on CT. In the field of banking activity, CT is an important element, being a competence listed for different tasks, being used daily when interpreting, analysing, and making

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decisions for external and internal clients. In HEI, results revealed that CT is present only at the course level.

Results triangulation of critical thinking for Business Informatics domain[1]

The partnership for this discipline was constituted by Hochschule Emden-Leer (HEI) and Orgadata (LMO). The classes analysed were in the field of Business Informatics, which is also referred to as Information Systems Management in the USA, the UK, and Finland. However, these two disciplines have some minor differences: Business Informatics traditionally focuses on technical aspects of systems within an organization, whereas Information Systems Management focuses on the role and effects of systems for the organization.

There is **no perceived difference** between HEI and LMO concerning **class objectives**, and **critical thinking direct and indirect reference** during classes. The data collected from the observations in both HEI and LMO shows that teaching and the educational methods used do not explicitly address the development of CT. Rather, the development of CT can be considered as a by-product of training disciplinary skills, since it is not mentioned to be explicitly focused in the classes analysed. The development of CT is also not taken into account when planning lessons/modules. However, some of the methods that are suitable for training CT skills were used during the teaching.

One of the main goals of teaching in higher education is to train students to use the methods and tools of the discipline. Business Informatics is a discipline

[1] The analysis presented in this section was obtained by interviewing the participants and not by following the research protocol presented in Part B.

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that mainly uses abstract tools and methods to deal with abstract constructs such as software. “Brain” work, i.e. thinking is an indispensable skill that students need. Critical thinking as part of the thinking process is required e.g. to assess the feasibility, profitability or quality of proposed solutions. Teaching materials and methods of business informatics implicitly include and stimulate CT.

With respect to the **critical thinking teaching strategies no difference was observed**. In all cases, HEI and LMO alike, **immersion** was favoured for the promotion of CT. An important aspect of teaching thinking skills is to encourage students to actively participate in discussions without being afraid of failing or saying wrong things. This requires an atmosphere of acceptance and tolerance. This applies in particular to topics in which analysis and design are in the foreground and in which creativity is required, in contrast to topics in which obviously only a few, even only one solution to a task is sought. The latter ones primarily require factual knowledge. CT skills are also required and indirectly taught in tasks such as the analysing one's own solutions or solutions of others for their correctness.

Although teachers have an understanding of the concept of CT, they do not explicitly teach or consider the development of CT in their classes as essential. However, the aspects that make out CT such as critical reflection of the topic under discussion are widely considered in the teaching. The teachers clearly see the benefits of CT skills for students’ professional careers. None of the teachers explicitly teach CT skills or take them into account when teaching or preparing their classes. However, the thinking abilities are generally in the foreground, for instance the ability to argue and to correctly use the vocabulary of the discipline. One teacher put it in the following way:

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"I don't teach CT explicitly. However, I take up current economic and technical developments in the lecture, question them and also show that critical reflection can generate new ideas, achieve improvements or expose false statements. I do not use explicit methods for this. In terms of time, it is about 5-10min per lecture hour." (Teacher, HE, HSEL, Germany)

Students' perceptions of CT are puzzling, as few of them have a clear understanding of what CT means. Students who have a clear understanding of the concept of CT, report that the teachers use learning materials that support the learning of CT. However, teachers report that they do not explicitly teach CT or take it into account when preparing classes. This means that the teaching of CT is kind of an integral part of the university teaching and the material and the problem situations that are given to the students create teaching situations which include elements that promote CT skills. The students identify various methods that are used in teaching to promote the CT skills, for instance discussions, initial topics to be further developed and critically discussed statements that need to be analysed, scientific papers and additional readings about some topics, case studies, statements of some scientists that need to be analysed from a certain point of view.

There have been many opinions regarding the gap between university teaching and the needs of the labour market in relation to CT. The clear understanding of students of their own responsibility for CT skills was especially interesting. One student put it in the following way:

"I don't think there is much of a gap because universities can teach you so much whatever the way they could, but at the end of the day, it all depends on the individual. How the individual develops his/her skills over time is what matters in critical thinking. And even if there are gaps, the individual can hone their critical thinking skills by gaining experience such as working on different projects under different mentors and help evolve them by being more logical and making the right decisions." (Student, HE, HSEL - Germany)

Another student said the same, but shorter:

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"Sure there is a gap. University gives us a foundation on which we can work our way up." (Student, HE, HSEL - Germany)

From the analysis of the respective documents we found that the learning materials contain slides, use-cases taken from the practice, created by the teacher or taken from the literature, books, and various exercises. Additionally, various tasks/topics are sometimes proposed and created by the students based on their experience. For example, one teacher reports that she does not create much material by herself. Instead, she uses ad hoc topics for discussions that the students bring e.g. from their jobs (if they are working), their interest fields, books or articles that they have read. The topic is discussed and novel aspects are created by considering the topic from multiple perspectives.

Learning materials such as individual or group exercises that are used to engage students in active learning situations can -depending on the task- contribute to the development of CT skills. Videos, while rarely used, foster student motivation for a topic and encourage critical thinking. On the contrary, recommended books and slides used during lectures serve to convey content-related knowledge in the discipline. The syllabi of individual modules describe the content of the subjects and the recommended literature, but do not refer to the development of CT.

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Results triangulation of critical thinking for the discipline of Veterinary Medicine

In this discipline, the University of Évora partnered with a Veterinary Hospital (HVA) as representative of one of the professional areas of practicing the veterinary profession.

Regarding the first variable of **class/course objectives concerning CT**, it was evident that during traineeships in labour market organizations, students are immersed in the daily routine of the profession, and engaged in trustable professional activities (e.g., collection of clinical history, physical exam, laboratory and imaging procedures, collection of biological samples). They are trained in professional procedures to acquire autonomy and confidence. In the beginning, they work under the guidance of the practitioner (trainer), and then they are requested to perform the activities and describe their findings and interpretation; they are also involved in the discussion regarding the importance of the collected data to discriminate between the raised differential diagnosis. Practitioners often use questioning to guide reasoning and the discussions, namely "Why, How, Which, What happens if, What now, What do you expect, How do you explain or What is your decision". Some questions may represent knowledge verifications, while others also appeal to the transposition of previous acquired knowledge to new situations that request a more specific approach. Later on during the traineeship, trainees are requested to make a clinical decision and they are trained to interact with the animal tutor (usually via role playing with a colleague or the practitioner), explaining the therapeutic approach or presenting recommendations at discharge. In general, during the traineeships, students work in exceedingly

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small groups or in a one-to-one group with the trainer. Also, they are periodically requested to engage in journal clubbing activities, or to make a presentation regarding a specific disease or the recent guidelines in the therapeutic approach to a particular condition. In summary, in the external traineeships, at the end of the Veterinary Programme, trainees are encouraged to apply theoretical knowledge in a practical situation, transpose knowledge into new situations, experience in observation, interpret complex data, propose a solution to the problem, how to keep adequate records and to communicate. They are also allowed to make mistakes (in a controlled setting), while stimulated to engage in reflective thinking.

> *"We greatly encourage them to venture out and make their guesses. (...) I accept and understand mistakes as a useful way of learning for them" (Trainer, LMO, PT_Pro_3)*

In the academy, in general, the theoretical classes are of an expositive or magistral type. Although some discussions may occur, questioning is often inconsequential, as it predominantly appeals to memory (knowledge verification). When teachers try to stimulate deeper thinking, they seldom trigger a response from students. The practical classes are often designed to present and train procedures. In some theoretical-practical and practical classes in the clinical field, which often revolve around a clinical case, some teachers try to promote reflection and debate, and develop logical and deductive reasoning. However, students seem to be foreign to such practices and when failing to respond to the questioning, the teacher usually gives the answer. Globally, we can conclude that CT has not been often formally stimulated. The use of clinical cases and resources, such as videos and computerized exams, have a lot of potential, but the teachers' lack of express intentionality, and the students´ uneasiness and hypo-reactivity of stimuli,

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block that potential. However, multiple and undetermined reasons could explain this issue. It is evident that training should be provided to teachers on how to better promote CT, and that it will also be important to train students to understand the concepts involved and accept different strategies.

Results on the second variable, namely whether **CT is explicitly referred during instruction**, reveal that CT is not often explicitly mentioned during instruction throughout the curricula of the Programme or the apprenticeships, whether in the academic or the labour market settings. In the labour market, fostering CT frequently evolved from the development of clinical reasoning around a medical case and the support of decision making. Students are usually requested to shift their thinking from a disease (the way they are trained to remember and understand the knowledge provided) to a patient-centred approach (translate knowledge in medical terms and reason around possible causes for a clinical condition). In HEI, an implicit reference to CT is seldom observed in classes, and internal/intramural apprenticeships often rely on less active learning activities, even though in the descriptions of the course/subject explicit mention to the development of clinical reasoning was found. It may be that this mention respects a more generalist or less structured conception of "clinical reasoning". Questioning is being used during classes, but the students often fail to respond, which leads the teacher to providing the answer. This observation is more notorious for the subjects/courses that precede the clinical subjects (final year of the Veterinary Integrated Master programme). However, the students´ failure in engaging and providing feedback to the teacher attempts to stimulate dialogue via questioning hints that they are not used to thinking about a particular case/situation/problem during classes.

As previously said, the interaction between trainee and trainer during external apprenticeships is closer and evolves around daily routines (veterinary

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activities in the clinics of pet animals). Besides training procedures, students are stimulated to engage in medical reasoning and decision-making in hospital settings, guided by the trainers´ questioning.

> *"we have to stimulate the students not to be simply receivers and elements of repetition of the information that is provided to them (...) use methodologies that allow this stimulus, case discussions, discussion of images, discussion of legislation" (Trainer, LMO, PT_Pro_1)*

As far as the model of **a good critical thinker** is concerned, the results identified some differences. In the LMO, reasoning within the professional context is explored more intensely than in the academic contexts. In the Veterinary Programme, the apprenticeships, albeit designed as core subjects, represent a very small amount of work for the students, in contrast with the larger mandatory courses/subjects. Furthermore, they evolve in a more passive way, relying mostly on the observation of the practitioner's interaction with the patient/animal and its tutor, compared with those in the labour market. Noteworthy, the “think aloud” approach – where trainers try to demonstrate their way of thinking – a methodology that might foster clinical and critical thinking, is not currently used in the apprenticeships. Still, in neither case, models or frameworks are provided to students/trainees to support CT development. It could be inferred from the observation of the interactions at HEI and LMO, that the academy remains more focused in the lower and intermediate dimensions of the Bloom taxonomy (e.g., knowledge, comprehension, and application) and in procedural knowledge, while the labour market apprenticeships are attentive to the higher dimensions (e.g., application, analysis, synthesis, and evaluation) and target the development of conceptual knowledge. We must notice, however, that the apprenticeships evaluated take place at the end of the academic program, when students are

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already empowered with the complete basic knowledge necessary to the profession, and a wider understanding of the discipline.

The analysis regarding the next variable, namely whether **improvement in students' CT is triggered** revealed a difference between HEI and LMO. Such a gap was mentioned frequently in the focus groups of professionals in the discipline, particularly at senior level.

One participant of the senior trainer FG stated:

> *"My question is more about the teaching itself and the way in which the student leaves the faculty, especially in terms of the traineeships, this is what I think should change a lot, for me it is often inconceivable that on the first day of the traineeship I say to a student "well you can start the consultation" and he tells me "I still can't because I still have no experience" (Trainer, LMO, PT_Pro_2).*

Some agreement exists among veterinary professionals that the HEI should stimulate better students' CT:

> *"The feeling I have is that when they come to me they come with a "yes man" attitude, everything I say is an absolute truth, they don't come with a critical sense. " (Trainer, LMO, PT_prof_11)*

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However, CT is not a skill directly or explicitly evaluated in the academic pathway or during the traineeships. For instance, during the teachers focus group, some teachers and one trainer stated:

> *"I think I'm not assessing that; I'll be honest. I don't think I'm objectively assessing it [referring to CT]." Later on, she adds ""It may be in the subjects' program, but I don't think it's an objective assessment criterion" (Teacher, HE, University of Evora-Portugal).*
>
> *"It's difficult to assess CT in itself, it's not easy" (Teacher, HE, University of Evora-Portugal).*
>
> *"I think it doesn't matter so much what conclusions they reach, but more specifically how they get there" (Trainer, LMO, Hospital Veterinário do Atlântico-Portugal).*

Despite LMO trainers having the concern to assess trainees' CT during the apprenticeships, they do it using non-formal methodologies, and therefore the assessment is mainly subjective. This issue should be explored and addressed in the future.

Concerning the references about **nurturing CT by referring to real labour market cases**, it was evident that for the discipline of Veterinary Medicine, the labour market provides "embedding" in real cases, where students act as active players, even if most of the discussion occurs outside the medical office or during handoffs. Students are pushed into reasoning and their decision making is supported by the medical reasoning they continuously develop. Still, an individual variation was noticed between trainers regarding the ability to stimulate deep reasoning in the trainees, just like it was also observed in teachers during the classes. In HEI classes, usually the activities were centred in knowledge acquisition and understanding a topic as well as in

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training procedures approaching different practical technical-related interventions particular to this discipline. Students learn the basic methods of acting (applying technical knowledge). This disparity in the CT nurturing is sometimes mentioned in the focus group discussions from professional stakeholders, who mention that universities should “provide more practice” to their students.

> *“we try, many times, to take real situations of the farms that we accompany and we provide these data and we try that the students manage through these data to try to understand what the main faults or problems of this farm are and many times the approach has to be multifactorial, it will involve several areas, we try that the students elaborate a small report" (Trainer, LMO, PT_Pro_4).*

The next two variables, namely the **teaching strategies and methods that promote CT**, were considered together. In the discipline of Veterinary Medicine, no courses are provided by the labour market organizations during the apprenticeships. The traineeships in the labour market pursue the reasoning ability of students more frequently using questioning to structure their ways of thinking. The question usually focuses on the daily cases presented to the clinics, so evaluation and analysis dimensions are present. Also, when considering the particularities of an animal, the owner goals or the economic aspects related to a particular situation, synthesis and divergent thought or action are stimulated. However, in the interactions observed, the ability to stimulate CT, and not only asking the student to summarize acquired knowledge to discriminate differential diagnosis, is highly dependent on the trainer. This is also true in the academic settings. In fact, it is generally accepted that teachers and trainers’ skills (even in a personal dimension) determine the success of the clinical reasoning or the CT skills in students/trainees. Within the

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academy, students are engaged in a more passive learning context. However, in some classes similar attempts to stimulate clinical reasoning are present, particularly in the final years of the Programme. Overall, learning tends to occur in a more passive way in academic settings, contrasting with a more immersive and active approach in the labour market. In both contexts, academy and labour market organizations develop a similar cognitive knowledge, pursuing the development of clinical reasoning. Nonetheless, in neither context the nature nor importance of the explicit need for CT promotion is acknowledged. However, we should carefully ponder this issue. It needs to be emphasized that a comparison between the formation provided at the academy and that of the labour market may be somehow fallacious. In fact, the apprenticeships in the labour market are performed when the student completed his/her entire academic pathway and retain a larger amount of cognitive knowledge. Up the most we could only compare between the last academic year and the curricular internship.

With respect to the variable of **tools and materials reflecting CT** in the HEI and LMO, a limited amount of material explicitly mentioning CT, on what respects the syllabus content, summaries or other materials, are presented to students. However, in the characterization of the curricular units available at the Programme website, there are explicit references to the development of CT or clinical reasoning and some metacognitive skills. But usually no mention of strategies to be implemented can be found. This is also the case for the way CT dimensions or the acquisition of CT skills and attitudes will be assessed oreven how they could contribute to the final grade in each course/subject.

The analysis regarding the **evaluation approaches** of CT surprisingly revealed that it is not tackled either by the HEI or the LMO.

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Finally regarding the **presence of CT** in each organisation small differences seem to exist in the depth of CT requested and trained in the LMO compared with HEI, mainly on what concerns the way they work the conceptual and procedural dimensions of CT.

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Part B.1. Educational needs for teaching and learning scenarios

Following the mapping research process, the partners distilled a list of educational needs that future apprenticeship programs should address. We shall present by domain:

Educational needs for Teacher education

The Labour Market Organisation chosen in the case of UOWM is not an organisation offering courses or any training to newly hired personnel. Thus, data analyses, regarding the LMO, focused on the teaching processes implemented in the context of primary education, as well as on the apprenticeships organised by HE in order to train future teachers in real life circumstances. According to the current data analysis, differences regarding the LMO and the HE resulted mainly from the focus group discussions and specifically with respect to the format of the apprenticeships.

The first major need that was highlighted by labour market representatives is the necessity for teachers to develop CT skills and dispositions in order to tackle critical incidents during learning and instruction. According to LMO stakeholders, teachers with limited experience (i.e. new employees) have a repertoire of teaching strategies and the ability to design detailed lesson plans. However, LMO stakeholders believe that new employees usually lack the skills to recognize when they should differentiate their teaching approach or show flexibility according to circumstances. Furthermore, they usually don't feel confident to reorganize activities in order to adapt to critical incidents in class. According to Tripp (1994), critical incidents are perceived as ordinary events that can take place in the classroom and present a dilemma to

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the teacher, who has to choose between at least two different courses of action to solve the problematic situation. Such critical incidents could be pupils' problematic behaviour or conflicts that require immediate decision-making and action. Previous studies have revealed various classifications of inservice or preservice teachers' voice regarding critical incidents (e.g., Badia, Becerril & Gómez, 2021; Leijen & Kullasepp, 2013; Stenberg, Karlsson, Pitkaniemi, & Maaranen, 2014). It should be noted that these incidents commonly consume valuable time from the teaching process as far as their management is concerned. Taking into consideration that students-teachers or pre-service teachers have the tendency to model their K-12 educational experiences during their practice, the exploitation of critical incidents in teacher-training has proven a powerful tool tackling this tendency. In detail, activities employing critical incidents foster the development of critical thinking skills and decision-making schemata in students-teachers by providing them with opportunities to reflect and take action on authentic teaching experiences (Griffin, 2003). The effective management of critical incidents is related to the term "pedagogical tact", which draws specifically from the notion of van Manen's pedagogical tact (van Manen, 1991), according to which tactful teaching is displayed when a teacher recognizes and understands the importance of particular situations and takes informed action. Pedagogical tact allows students-teachers to adjust a given educational theory to meet the requirements of individual learners or classrooms (Gastager, Nebel, Präauer, Patry & Fageth, 2017), while they are also in the position of fulfilling school's double assignment (Tapola & Fritzen, 2010), that is teaching subject knowledge while at the same time aiming at the creation of a values framework in the classroom settings with the application of their obtained CT skills and dispositions. Based on this rationale, teachers being equipped with CT skills and

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dispositions can instill them in the teaching process; thus encouraging pupils in this direction, as well (Dimitriadou, Vrantsi, Lithoxoidou & Seira, 2019).

The second need that stakeholders identified in regard to Critical Thinking and the teachers' training apprenticeships, concerned teachers' interaction and communication with pupils' parents. The Labour Market stakeholders identified that this form of interaction and communication can usually be considered as essential but simultaneously difficult in terms of engaging within the school context. Literature has identified many potential barriers that could tackle effective parental involvement and communication with school teachers (e.g., Hornby & Lafaele, 2011). However, previous research has identified that including training on parental communication can increase teachers' perceived confidence, efficacy and perceived usefulness of such a course (e.g., Hoover--Dempsey, Walker, Jones, & Reed, 2002; Symeou, Roussounidou, & Michaelides, 2012). Although there is no previous evidence indicating the importance of Critical Thinking for efficient parental communication and interaction, we acknowledge that such types of communication could prove demanding for teachers in triggering analytical and critical thinking while coping with them.

Another problem which was highlighted as a deficiency of apprenticeships in terms of Critical Thinking was the need for students-teachers to adapt to the schools' daily administrative routines (e.g., during discussion in the teachers' board, etc) and to effectively deal with collegial collaboration and interaction. This problem also relates to communication skills; thus, there are further implications for Critical Thinking skills and dispositions. Labour market stakeholders identified that early in-service teachers have not been familiarized with administrative issues that teachers undertake at the macro-level of the schools' operation emphasizing the need

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for early in-service teachers' ability to form good relationships or to effectively communicate with colleagues or the administration. According to LMO stakeholders, new teachers do not usually interact with more experienced teachers that could provide useful suggestions and act as mentors to them. They argue that such interaction could provide suggestions to new teachers or knowledge about administrative issues they could not easily get otherwise. Moreover, LMO stakeholders suggested that early in-service teachers usually avoid engaging in activities, such as questioning the teachers board's decisions with which they might not agree or providing alternative solutions to a problem. However, it should be mentioned that LMO stakeholders recognized that this issue also relates, at least in part, to school culture and their own limited efforts to include new personnel in such activities. However, they argued that engagement with such activities demands Critical Thinking skills.

In addition, a need that resulted from the focus group discussions and was mainly highlighted by labour market partners was that students-teachers lack self-confidence regarding their role and identity. In addition, LMOs supported that self-confidence is essential not only in learning and instruction but also in parent-teacher communication. Therefore, they suggested that self-confidence in the teachers' role and identity should be cultivated during apprenticeships. Additionally, confidence in reasoning is an essential Critical Thinking disposition allowing one to trust the soundness of their own reasoned judgments. Further, an appropriate level of CT self-confidence in relation to one's maturity and mastery in CT skills' could prove as a desired developmental trajectory for all students (Facione, Sanchez, Facione, & Gainen, 1995). Previous research findings have indicated that early career inservice teachers usually reveal lack of confidence in their educational abilities and a sense of failure to act properly in ethical dilemmas and critical incidents (Shapira-

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Lishchinsky, 2011). Further, Kim and Klassen (2018) revealed that expert, beginning, and pre-service teachers present differences in strategies, scope, content, and reasoning of the cognitive processes as well as the confidence ratings on the accuracy of their responses when tackling complex school-based scenarios. Still, the findings are encouraging, suggesting that self-confidence in pre-service teachers can be enhanced through the exploitation of instructional approaches that promote Critical Thinking such as problem-based learning (e.g., Saputro, Atun, Wilujeng, Ariyanto, & Arifin, 2020).

A major problem identified during the focus group discussion with HE and LMOs was that students-teachers are not informed about the ill-structured problems that may arise both during apprenticeship and their future professional role. A discrepancy seems to arise since whilst CT is implicitly approached during lectures and also traced in the syllabus, HEI focuses on students getting acquainted with teaching methodology and detailed lesson plans, rather than being familiarized with the full spectrum of responsibilities related to their profession. Consequently, students-teachers do not seem to adequately familiarize themselves with CT skills and dispositions, which are of paramount importance for their role. In this light, both HEI and labour market representatives seem to agree that students-teachers should actively practise on ill-structured problems as well as case studies that will successfully lead them to obtaining CT skills and dispositions, which may be applied during their apprenticeships. The exploitation of critical incidents, ill-structured problems, case studies, problems with wicked tendencies or work-based scenarios will allow students to develop decision making schemata to cope with the complexity of teachers' role, which entails juggling the teaching process, other issues concerning classroom organization and management, interpersonal relationships as well as interaction in and outside classroom settings. Although

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the level of teachers' effectiveness increases with years of experience (Atteberry, Loeb, & Wyckoff, 2015), it was evident that the LMOs (i.e., school teachers and directors) expect from students-teachers to perform at an almost equal professional competence level to their experienced colleagues (Tait, 2008). Although this expectation wasn't endorsed by the HE instructors, the importance of training to increase the teachers-students' effectiveness level and reflection on-action (Schön, 1983) was acknowledged.

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Educational needs for English as Foreign Language

Participants at the focus group discussions suggested that in Lithuania, EFL teaching is still deeply rooted in a conservative paradigm. Too much attention is given to forms, rules and rigid frameworks and little to content and ideas. They stressed the difference in the teaching and learning approaches between two different epochs and different universities. Due to the fact that a number of teachers completed their studies before the breakup of the Soviet Union, when the educational system and the labour market were based on different ideologies and principles, some differences were notable.

Thus, the educational needs identify by the present research are:

1. Need to train HEI personnel on CT due to different political and historical background of the area;
2. Need to Include CT in EFL education, in both HEI and LMO.

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Educational needs for Business and Economics

The main differences constitute a top down approach in the university, while in the labour market the incorporation of the theory in activity and the integration of the theoretical elements in the most applied behaviours, through experiential methods are emphasized. The LMO approach is bottom up since participants are content creators.

LMO focuses on diverse teaching methods, delving into understanding and discovering through their own real-life experiences, interpreting theories and information instead of simply memorizing information.

Thus, the educational needs are linked to a more dynamic, diverse teaching approach, focused on students' needs, primarily:

1. Need to change the instructional approaches to a more student-centered approach;
2. Need to emphasize more on experiential learning.

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Educational needs for Business Informatics

One utmost important aspect in teaching the thinking skills is to encourage the students to actively participate in conversations without fear of failure or fear of saying something wrong. For this an atmosphere of acceptance and tolerance is needed. The training of CT happens indirectly, since CT as such is not in foreground but the analysis of the case to be considered, so there is a need to explicitly promote CT in the class. Both HE and LMO do not use explicit methods for CT. Nevertheless, it is essential to consider that not all “gaps” need to be addressed. University has a different purpose, teaches necessary knowledge and skills that LMO cannot and should not take into consideration.

Concluding, the educational needs are:

1. Need to focus less on the provision of factual knowledge;
2. Need for explicitly promoting CT, both in HEI and LMO.

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Educational needs for Veterinary Medicine

In the Veterinary Medicine field, CT is often a concept overlapping Clinical Reasoning. Clinical reasoning shares some traits with critical thinking, namely on the intentional commitment to raise well-formulated and clear questions; to gather and assess relevant information; to open-mindedly ponder the available alternatives; to recognize and assess assumptions and implications and associate them to practical consequences; to communicate effectively with others, while engaging with and finding solutions to complex situations. It is crucial to engage in constant monitoring of thinking and self-reflection to maintain a high level of clinical reasoning, as well as to continuously practice metacognition and self-correction (Kuiper, Pesut, Kautz, 2009). In general, clinical reasoning aims to provide confidence and ability to interact effectively with other people and tasks, putting effective decision-making skills and associated actions in practice. According to Christensen and colleagues (2008), clinical reasoning skills "…involves integration and effective application of thinking and learning skills to make sense of, learn collaboratively from and generate knowledge within familiar and unfamiliar clinical experiences". Four dimensions have been identified in clinical reasoning: reflective thinking, critical thinking, dialectical thinking, and complexity thinking.

In the labour market apprenticeships, trainees are entrusted with well-defined activities that request them to mobilise knowledge, and perform routine procedures in the veterinary medicine discipline. Entrustable professional activities have been proposed for the Veterinary Medicine discipline in the last decade within the framework of a competency-based education (Salisbury et al., 2020). Entrustable professional activities (EPAs), i.e. tasks representing units/fragments of professional practice that can be entrusted to a student under a given level of supervision, demand the student

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to demonstrate competence in these tasks. EPAs require multiple integrated competencies (Favier, ten Cate, Duijn, & Bok, 2020) and should be carefully designed. They must be developed within a given time frame, be observable and measurable as well as contribute to focused entrustment decisions (Duijn, Ten Cate, Kremer, & Bok, 2019). Furthermore, the following must be evaluated, namely the assessment moments aligned with the students' clinical workplace or previously established outcomes, and feedback provided for correction if needed. More than the development of procedural competences, EPAs allow to foster the student´s clinical reasoning. During the veterinary formation (academic and apprenticeships) the purpose is to develop medical/clinical reasoning. When developed in the academy, EPAs could gradually allow students to reach autonomy in the processes previously trained, as well as to improve their ability to communicate with the animal tutors and other professionals. The tasks may vary in size, type and complexity, and thereby they can be adjusted to the students´ degree, step-wisely through the graduation programme. Through EPAs, trainees may acquire competencies including knowledge, skills, and attitudes (Ten Cate & Taylor, 2020), preparing themselves for professional work.

Using different approaches, both the academic and labour market associations aim to nurture clinical reasoning and indirectly critical thinking in their students, with different outcomes. It is usually accepted that a potential gap exists between the tasks graduates are prepared to do unsupervised and what the labour market expects (Favier et al., 2020). This, in fact, reflects some of the comments provided by stakeholders during the FG interviews. Considering the conditions where classes are developed in some HEI, with a high ratio between students and teachers, activities to explicitly or formally advance clinical reasoning are often poorly explored and left to be detailed in

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the academic traineeship, in the final year of the graduation programme. However, it could be feasible to include it throughout the programme, using intramural apprenticeships (with smaller groups of students tutored by a trained practitioner), and interwoven some of those activities with the syllabus and activities in core subjects/courses (e.g., through scenarios or case-based learning), while enrolling practitioners and teachers of different disciplines to work together providing the needed feedback. In some curricula, this approach may request the modification of the programme structure. But the benefits are enormous, since EPAs operationalize clinical competency development, including critical thinking, through a stepwise and safe engagement of trainees.

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Part B.2 Recommendations for future learning scenarios

Recommendations for Teacher Education

Based on the data analysis and the discrepancy traced between the courses offered by HEI and the needs of LMO, the following recommended principles were organized in combination with contemporary literature. It can be claimed that these principles can facilitate CT instruction in HEI, while simultaneously bridge the existing gap in terms of LMO needs. The principles also draw on elements which are delivered through CRITHINKEDU outputs and refer to the teaching process, methodology and practices. Later on we present a set of basic principles that should be employed for teaching CT in Higher Education Apprenticeships taking also into account specificities related to teachers' education.

A) Infusion and explicit CT instruction

As far as it concerns the recommended CT teaching approach, infusion is believed to support explicit instruction since CT general principles are made explicit and the process is embedded in specific subject matter. According to Tiruneh, Verburgh and Elen (2014), who conducted a review regarding the effectiveness of CT instruction in Higher Education, most of the intervention studies included in the review followed either immersion or infusion, which may indicate that these two approaches lead to optimum results. Additionally, according to data analysis, CT is currently implicitly taught in HEI, which may not be considered as conducive since students do not seem to become equipped with those skills and thus transfer them in their apprenticeship or instill them during their in-service experience. Therefore, according to Marin and Halpern (2010), explicit CT instruction seems to be more effective and fruitful in the direction of transferring these skills and dispositions to other

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similar everyday problems, ill-structured conditions or critical incidents. Additionally, as highlighted by the Educational Protocol for the promotion of CT in Higher Education developed by the CRITHINKEDU project, explicit instruction and engagement of students with CT is essential (Elen et al., 2019). Specifically for Teacher Education, explicit instruction of CT is also determined as an enhancing factor according to Lorencová, Jarošová, Avgitidou and Dimitriadou (2019), who conducted a systematic review of CT practices in teacher education programmes.

B) Explicit instruction of ill-structured problems, critical incidents, case studies, work-based scenarios, problems with wicked tendencies in teacher education

The exploitation of ill-structured problems, critical incidents or problems with wicked tendencies allow the involvement of various CT skills and dispositions and engage students in decision-making processes that offer them the opportunity to reflect as well as activate metacognitive strategies during a problem analysis. Every problem, incident or case study included in instruction for CT should not focus on a clarified right or wrong answer but rather offer the opportunity for debates through which participants will be familiarized with reflecting on their own judgments (Snyder & Snyder, 2008). In this light, participants will be in the position of realising that these problems often have wicked tendencies, resulting in good or bad decisions, rather than right or wrong answers (Peters, 2017). Moreover, these problems may be difficult to solve or may be followed by a range of possible explanations and solutions that are not apparent, easily approachable or unique (Peters, 2017). Based on the above rationale, explicit instruction of problem situations may lead students to exhibiting both their declarative and procedural knowledge, which can be a

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means of fostering and evaluating their CT (Belecina & Ocampo, 2018: 115; Elen, et al., 2019).

C) Contemporary teaching methodologies

Emphasis should be placed on contemporary teaching methodology which may include authentic instruction approaches and teaching strategies such as role-playing, dilemmas and real-world problems. Based on this rationale, simulations, which entail case studies may also be used (Abrami, et al., 2015). Another contemporary teaching methodology proposed is Values *and* Knowledge Education (V*a*KE), which could be applied as a teaching approach in HEI through which students' CT skills and dispositions could be fostered and promoted through the introduction of moral dilemmas in classroom settings (Pnevmatikos, Christodoulou and Georgiadou, 2019).

D) Mentoring during internships/ apprenticeships

LMO representatives explicitly referred to the importance of student-teachers being mentored by an experienced in-service teacher. The process in which an experienced teacher mentors/ coaches a younger colleague or student (Abrami, et al., 2015) is believed to enhance CT instruction. It should be noted that this is the case when mentoring is organized and designed in the light of constructive dialogue and democratic processes, while it usually entails a close and fruitful collaboration with HEI through which every participant benefits. Mentoring is to be conducted by a group of teachers, school administrators and principals that will be engaged in a network of social and "caring" relationships directed to learning for student-teachers and newcomers (Moonie Simmie & Moles, 2011). It could also be perceived as an attempt to bridge the gap between theory and practice, which will foster the mentees in translating the theories learnt in Higher Education into practical action through

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a variety of educational situations. In that sense, mentors in apprenticeships are seen as experts for reflective acting that will scaffold preservice teachers' development of professional teaching skills (Gastager et al., 2017). Therefore, mentoring can not only promote preservice teachers pedagogical tact, which is among the needs reported by the LMOs in the aforementioned findings, but it is also in analogy with experiential learning (Kolb & Kolb, 2008), which is accompanied by reflection and gradually leads to learners' autonomy while involving various aspects of CT (Harrison, Lawson & Wortley, 2005).

E) Metacognition for transfer

The issue of CT transfer remains a rather thorny situation and a continuous challenge for educators dealing with the domain. According to Halpern (1998), it is possible to teach for transfer with metacognition. This is the case when instruction is organized and designed in this direction so that students get acquainted with transferring their skills to a variety of situations through different domains. This can be realized when students approach problems or situations and elaborate on their structure in an attempt to trace and highlight elements that tend to be prominent instead of merely domain specific. Based on this rationale, metacognition seems to be of major importance during CT engagement, since students are offered the opportunity to discuss and thoroughly understand their way of thinking as well as to be responsible for their own strategies and make decisions regarding the time or effort that they will invest in a task (Halpern, 2014). Finally, rendering students aware of the transferability of CT skills and dispositions among problems, cases or various settings can prove beneficial for the CT transferring process, *per se* (Elen, et al., 2019).

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Recommendations for English as Foreign Language

Developing teachers' media and information literacy competencies as well as CT teaching strategies, skills, methods and approaches raises a clear understanding of the affordances of technology and how it can be linked into language learning in the remote classroom. Additionally, ICT allow learners the opportunity to work simultaneously and receive and give feedback, encourage independent learning and autonomous research, personalise home learning, provide a wealth of ideas for remote teaching, retrieval practice and how to blend synchronous and asynchronous learning by learning to use and create audio, video content and images in order to trigger students' creativity and critical thinking and develop their individual speaking, listening, reading and writing skills.

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Recommendations for Business and Economics

The present research showed that the future educational activities nurturing CT should involve:

- experiential learning for students;
- explicit CT education through infusion approach, for both HEI and LMO, and a wider usage of social-constructivist teaching approach for HEI;
- using teaching approaches that help students surpass memorizing and reproducing without filtering information, analysing, questioning, arguing;
- using case studies from business and inviting guests from business to present them in classes will bring reality in university, as well as spring questioning and open-mindedness;
- train the trainers for teachers in HEI; bringing an active engagement of HEI teachers in learning pedagogical approaches and methods that nurture CT.

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Recommendations for Business Informatics

A. Mix teaching strategy

Business Informatics is a field of study that integrates multiple disciplines, such as computer science, economics, law, data science and mathematics. It deals with the application of information technology and its impact in and for organizations. Methods and tools of Business Informatics as a discipline require students' abstract and conceptual thinking, whereas the subject content knowledge and its application in particular demands a high level in the development of intellectual abilities and skills. Business Informatics curriculum and single modules describe the development of higher-level cognitive skills of students in their outcomes. The higher-level skills of the cognitive domain are the abilities to analyse, evaluate, and create (Anderson & Krathwohl, 2001). "Analyse" is defined as an ability to break material into constituent parts and determine how parts relate to one another and to an overall structure or purpose, "evaluate" as an ability to make judgments based on criteria and standards, and "create" as an ability to put elements to form a coherent or functional whole and reorganize elements into a new pattern or structure. Two levels "Analyse" and "Evaluate" reflect two skills "Analysis" and "Evaluation" of the CT definition made by Facione 1990. The cognitive skill of the lower level - "Understand" (Construct meaning from instructional messages- Anderson & Krathwohl, 2001) - reflects the CT abilities of interpretation and inference. A Mix approach to teaching CT skills to Business Informatics students is recommended. The content is important and remains the main goal of a module, whereas a combination of both implicit and explicit transmission of CT principles should be practiced.

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B. Teaching approaches to impart critical thinking skills and dispositions

Activating teaching approaches, methods and techniques should be used to develop CT skills of students. Lectures have to be made interactive by integrating students' discussions into the presentation of the subject matter content. Problem- and project-based learning should be used. An important point here is the definition of problems to be solved during problem-solving sessions and project tasks to work on during student projects. Ill-structured problems and tasks and group work offer the students the opportunity to develop not only CT skills such as analysis, evaluation, explanation, but also CT dispositions (see Facione's framework). In these teaching approaches, the role of a teacher as a mentor and facilitator for student learning is a crucial component of learning success.

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Recommendations for Veterinary Medicine

From the data analysis some mismatches were identified between the courses offered by HEI and the needs and apprenticeships offered by LMO, that drive the present recommendations. The proposed recommendations were based on a literature review on how to foster CT in health-related disciplines and aims at mitigating the mismatches identified in this aforementioned empirical work. Furthermore, the principles proposed herein also imbibe in the outputs of the former project – CRITHINKEDU.

Clinical reasoning and decision-making are sought competencies in the field of Veterinary Medicine, expected to be mastered by early graduates. Clinical reasoning and critical thinking share some traits, namely on the intentional commitment to raise well-formulated and clear questions; to gather and assess relevant information; to open-mindedly ponder the available alternatives; to recognize and assess assumptions and implications and associate it to practical consequences; to communicate effectively with others, while engaging with animal´s tutors to guarantee its compliance and finding solutions to complex situations. It is crucial to engage in constant monitoring of thinking and self-reflection to maintain a high level of clinical reasoning, as well as to continuously practice metacognition and self-correction.

Development of critical thinking /clinical reasoning skills have been associated with a reduction in medical error, an increased autonomy and self-confidence and a decreased burden at the entrance in the labour market. Practitioners often work with ill-defined situations immersed in a fast pace and intensive environment.

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A) Hybrid CT instruction

The activity will follow a social-constructivist approach. In the medical disciplines, immersion in real working settings is often used during students training and apprenticeships. It is believed that through experience in the routine of a medical placement, students gain “practical skills” (Marckmann, 2001; Payan-Carreira, Cruz, Papathanasiou, Fradelos, & Jiang, 2019). To increase the efficacy of the strategies proposed to CT development in this discipline, and since the explicit teaching of CT (infusion approach) has been proven as more effective (Tiruneth et al., 2014; Payan-Carreira et al., 2019) we propose a hybrid approach. While using some activities issued from the daily routine of a veterinarian practitioner, we will explicit CT instructions and pedagogical activities supportive of CT development.

B) The use of ill-structured problems, case- and project-based learning in Veterinary Medicine

In daily veterinary practice, professional activity involves both well-structured situations and ill-structured challenging situations. Using an ill-structured situation as a starting point in the proposed activities, ranging in the difficulty levels so they can be adapted to the level of the student and also the topic at hand in a particular course or apprenticeship, we target to enhance students CT skills and dispositions. Using structured activities, we further aim at stimulating students' reasoning skills so they can provide support to decision-making in veterinary contexts, from the Clinics setting to Public Health and Sanitary Inspection (only to mention some of the areas of expertise tackled by the Veterinarian professional).

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Scaffolding the activities with debates or questionings students will interact with the teacher to discuss the thinking process, the presentation of a solution to the problem (although more than one solution is feasible, the student must select the one that he/she considers the most suitable for that particular case), and argue their decision making and defend it to a 3rd party. Moreover, while training decision-making during the proposed activities and the intramural internships, the student may learn from mistakes and errors, in a controlled setting.

C) Teaching methodologies

In the labour market organizations (hospital settings) the reasoning is explored based on entrusted activities requested to the trainees and through discussion with the trainer. In mimicking the activities developed by LMO in their apprenticeships, we proposed that, in some practical classes and during intramural traineeships, students should be entrusted with short procedures or activities that will enable their autonomy, confidence and train their proficiency in daily professional responsibilities. These tasks sought to be interwoven with case-scenarios or problem-based learning activities to be developed in different courses, to advance the students' clinical reasoning and critical thinking skills and dispositions (Barrows & Tamblyn, 1980; Gomes, Brito, & Varela, 2016).

Entrustable professional activities have been proposed for the medical professions and often used in Medical Schools due to their powerful efficiency in the development of medical reasoning skills. Our research showed that the use of active learning strategies or strategies fostering critical thinking in the veterinary medicine programme (neither within one HEI nor across national HEI) is not homogeneous between teachers. This might be explained by the

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huge amount of information they must convey in their learning outcomes, on the one hand, and the fact that veterinary teachers are not requested to have pedagogical formation for teaching. Therefore, it would be beneficial to propose some sessions to qualify the teachers, particularly in the field of pedagogic methodologies and strategies, within an institutional effort to sustain teachers ´professional development. By using scenarios issued from professional daily settings, adapted to each course syllabus, student will navigate through the problem: from identifying the causes that may be underlying it, to find an explanation for it, and ponder different solutions until filtering into the one he/she thinks to be the best, as well as evaluating and previewing the outcome from the solution applied to schedule new interventions. Therefore, the problem- or the case-based learning approach will allow students to master conceptual knowledge and grasp procedural knowledge within the Veterinary domain. Most activities to be proposed herein will tackle the CT skills that also support clinical reasoning and decision making, which will be complemented in particular cases with procedural skills (in clinical settings, mostly), as requested by the European guidelines for Veterinary Medicine graduates at day-0.

D) Mentoring

Mentoring is constantly necessary, either in the activities to be implemented throughout apprenticeships or during classes. It is deemed that a similar mentoring process may be available for both teachers and trainers regarding ways of CT development. It is also desirable to maintain a close interaction between LMO and HEI to maintain the efforts to reduce the mismatches that were (and could be) found between the two sectors, and to shift the focus from

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a more conceptual knowledge to the construction of a procedural knowledge within Higher Education.

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Part C. Learning Scenarios for work-based apprenticeships

Each team HEI – LMO created two learning scenarios taking into consideration the findings, the sets of recommendations and the identified educational needs. Hence, ten work-based learning scenarios that will be enhanced in the future activities of the project were developed. We recommended that at least one of the scenarios should be in the format of a syllabus in order to ease the work for Intellectual Output 3, where teachers and trainers will collaborate for the development of the CT blended apprenticeship curricula.

We proposed a check-list to help partners to create the syllabus, which is presented in Table 1. Later, we shall present, by domain, the learning scenarios.

Table 1: Check-list for learning scenarios creation

Steps	Name of the step	Plus	Done
1	Write the title of the class	you can change it later if not corresponds anymore	
2	Briefly, describe the themes, concepts, and aims.	Make sure there are explicitly describe CT development	
3	Think about a time period.	Set a total amount of hours for the class	
4	Which teaching approach do you favor?	A behaviourist: teacher centred, precise activities and steps for achieving performance, precise and measurable evaluation criteria, directed learning.	
		A social-constructivist: the most important is to be involved in the activity, cooperative learning, social interaction is the key to learning.	
		Rational/cognitive: concept formation, concept clarification, concept transferring.	

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		Personal approach: all goes personal. Learning, goals, study methods, you work on students' personal problems.	
5	Which CT teaching approach do you favor?	Immersion (non-explicit CT)	
		Infusion (explicit CT)	
		Hybrid (both of the above)	
		Dully note that non-explicit CT is less efficient.	
6	Think about the learning environment.	Where? Describe. What materials will you use?	
7	Write thoroughly the learning outcomes (results) of the class.	Put explicitly CT related outcomes referring to Facione's (1990) framework. Precisely, which skills and which dispositions your class will try to develop or to improve?	
8	For the results above, what content is the most suitable?	Make sure the content is both academic and labour market related (real problems, real cases, real needs, etc.)	
9	Which methods are the most suitable for learning outcomes?	Pick activating methods	
		Pick methods that challenge students	
		Or invent something completely original!	
10	Describe, as if you are a filmmaker, gradually, the entire class.	At this point, you can describe learning activities in the format you find it suitable: a classical, table format; a graphical format: diagram, interactive diagram, map (like a treasure map), interactive map; narrative (the journal), etc.	
11	Organize the timeline the way you find it suitable, you are not obliged to follow a timetable (e.g. 2h for a class). However, you will need to set a total amount of hours for the class.		
12	Link each learning session to its learning outcome.		

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13	Link each learning session to its content (domain specific **and** CT related).		
14	Link each learning session to the employed methods (domain specific **and** CT related)		
15	Link each learning session to its evaluation method or feedback method (domain specific **and** CT related)		
16	Final examination	Make sure that the final examination contains items or tasks for which CT is essential. Therefore, CT is a requirement for class graduation.	
17	Because it is a joint initiative with the labour market organization, take into consideration issuance of certificates.		
18	Well done! You have created one learning scenario!	Now be critical with your work and create another one.	
19	On the other hand, maybe you had many ideas.	Then you should work on both scenarios at the same time.	

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Learning scenarios for Teacher Education

Taking into consideration the importance drawn from LMOs and HE instructors on the exploitation of ill-structured problems, case studies and critical incidents for the apprenticeships enhancement in terms of Critical thinking as well as the importance of developing teachers pedagogical tact while dealing with critical incidents, two work-based scenarios are developed. The scenarios were organized in the light of close collaboration with LMO tackling commonplace issues that could take place in the school context. It was considered that LMO representatives' experience and their clarified opinion regarding everyday problems at school settings would extensively facilitate the scenarios construction. More importantly, as it was revealed through focus groups, LMO representatives were ready to present a range of ill-structured problems, which extend future teachers' pedagogical role and have further implications for other aspects of their professional life (e.g. administrative issues). However, they particularly emphasized issues concerning the activity load in conjunction with time management and pupils' conflicts as recurrent problems that are not adequately tackled by students-teachers. The scenarios included in this section are initial suggestions that can be tailored according to the specific needs of a Higher Education Curriculum. However, they attempt to incorporate the design principles suggested in the previous section regarding CT implementation in teachers' education. It should be noted, though, that the principle referring to mentoring is to be designed with close collaboration between HEI and LMO and is not necessarily addressed by the following scenarios.

Introductory Activity for explicit CT instruction:

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For students to become acquainted with CT skills and dispositions, it should be guaranteed that these are explicitly described and taught during lectures. To this end, a jigsaw activity with a thorough analysis of CT definition as well as skills and dispositions is to be organized and further applied as an initial step preceding the following scenarios. With such an activity, students will have to work in groups while discovering and constructing new knowledge and they will also be able to discuss their ideas and perceptions regarding the concept, in general. Another advantage of jigsaw is that constructivism is going to be actively applied so it is expected that students' engagement and motivation enhancement will be promoted.

Scenario 1: Pupils' conflicts

Themes, concepts and aims: The main concept of this learning scenario is to actively engage students-teachers in the direction of employing CT skills and dispositions over unexpected events during their practicum in primary education. The concept puts emphasis on a finding which arose through the focus group discussion with school directors. In detail, they claimed that students-teachers meticulously organize their teaching process taking into consideration the teaching methodology, though they seem to ignore that during lessons unexpected events may take place which will deviate the teaching process or totally obstruct it. Conflicts between pupils may indicatively be an unexpected event.

Aim: Based on the above rationale, this learning scenario aims at teaching teachers-students critical thinking skills and dispositions which may facilitate them in the direction of dealing with problems in the classroom, which may severely obstruct the teaching process.

Time period: 2 sessions

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Teaching approach: Social – constructivist

CT teaching approach: Infusion

Learning outcomes: Specific CT skills and dispositions

During the lesson break in primary school, a major conflict takes place between two pupils from the class that you are responsible for. Pupils have never fought before, but there was a serious misunderstanding since one of them tried to organize a surprise party and the other one revealed the secret to the interested party. You are unaware of the conflict event as well as for the reasons that led pupils to such an extensive conflict. After the break, pupils return to the classroom. You have thoroughly designed your teaching plan, organized the material and you are ready to start. Pupils enter the classroom but the two conflicting parties are still really upset and cannot stop arguing. You try to ask them what is going on and the reasons for their fight but no satisfying answers are offered. Conflict seems to escalate and the rest of the pupils are involved by stating their opinion, arguing with each other, and expressing their point of view. Class is separated into two groups fighting with each other. You are unable to start your lesson and pupils do not seem to listen to you.

What will you do?

1st Session

Activity	CT skills	CT dispositions
A) Draw a diagram or any other display that organizes the information offered by the aforementioned scenario.	Interpretation, Analysis	Systematicity

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B) Which of the information presented in the scenario is not relevant or does not influence your problem?	Evaluation	
C) Work in groups. Organize a two-column table with your potential actions in order to manage pupils' conflict and continue your lesson. Describe your actions in column A and the expected results in column B. Clearly state the reason why you expect these particular results.	Explanation, evaluation, analysis	Systematicity
D) Present the table's information to the classroom. Other groups members should find 2 reasons to support the expected results and 2 reasons that do not support the expected results.	Explanation, inference	Open-mindedness
E) Watch the video: https://www.youtube.com/watch?v=DazLm-VB-Ik What are the advantages and disadvantages of the teacher's approach in this video? (Pedagogy domain specific)	Evaluation	Inquisitiveness

2nd Session

Metacognition (Halpern, 1998)

Work in groups:

1. What CT skills and dispositions may be useful in solving this problem?
2. How difficult do you think it is to solve this problem?
3. How much effort and time is this problem worth?
4. What is the reason/ goal for engaging in extended and careful thought of this problem?

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Scenario 2: The case of Mary, a pre-service teacher

Higher Education Course:	The scenario could be employed for apprenticeships of Science Education, however with proper adjustments the scenario could be exploited in almost any course demanding (Technological) Pedagogical Content Knowledge
Learning Outcomes:	➔ Students will experience and engage with CT skills such as interpretation, analysis, inference, evaluation, explanation, self-regulation ➔ Students will experience CT dispositions such as truth-seeking, open-mindedness, analyticity, systematicity, self- confidence, inquisitiveness, cognitive maturity ➔ Students will familiarize with lesson planning on science education ➔ Students will engage in decision making in critical incident triggering pedagogical knowledge ➔ Students will engage in decision making in critical incident triggering subject matter (content) knowledge ➔ Students will engage in decision making in critical incident triggering contextual knowledge
Duration:	2 sessions
Teaching Approach:	Social – constructivist
CT Teaching Approach:	Infusion
Learning Environment:	Hybrid within class and online mode (blended learning will be supported) Additional materials exploited could be literature on the respective topics under discussion Reflection Sheet A problem to trigger the learning process (following)
Teaching methods	Problem based learning Collaborative learning Debating-argumentation

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Mary visited the school where she would teach the forthcoming week a module on science education. She spoke with the class teacher in order to be informed on the topic of the module she would have to prepare and receive a catalogue with students' names. The class teacher told Mary that she would have to prepare her instruction on the concept of light propagation. Additionally, the class teacher mentioned that the students are well behaved and motivated to participate actively in all courses.

Mary prepared her teaching plan and thought that she would do great during her apprenticeship's instruction. She prepared the physical manipulatives for the experiments that the students would carry out during the instruction as well as a worksheet. She had decided to have her students form groups of four during the experimentation based on their original sitting position in the classroom.

Mary started her instruction and encountered many difficulties. During the first brainstorming activity she realised that one student was very enthusiastic, consistently interrupting and answering her questions without allowing other students to elaborate their ideas. Mary asked the student to stop interrupting and allow her classmates to participate in the activity. In addition, Mary realised that two students were discussing and did not participate in the activity. Mary approached the students, John and Bill and asked them to pay attention. However, the students ignored her and continued talking to each other.

Mary asked the students to form groups and provided them with a worksheet in order to start working on the first experimentation activity. Soon, she realised that the class was not dark enough and the experiment was not carried out successfully. The students had difficulties in conducting the experiment, because the steps of the experiment were not described clearly in the worksheet and as a consequence they had difficulties in understanding the concept under discussion. Students' frustration was evident. At the same time, John and Bill continued interrupting the instruction and now they were playing games with the physical manipulatives exploited for the experiment. Mary stopped for a moment to think. She couldn't continue with her original teaching plan. She had to be flexible and make some adjustments to her instruction.

You are in the same position as Mary, what adjustments would you make in order to achieve your learning outcomes?

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What would you have handled differently to avoid facing the difficulties of Mary during your instruction?

Session	Instructional phase	Action	Class formation	CT skills	CT dispositions
0	Clarification	Explicit instruction on problem solving Explicit instruction on CT skills and dispositions	Plenary	All CT Skills	All CT Dispositions
1st session	Introduce the problem	Understand the variables of the problem	Plenary	Interpretation	
	Reflection	How am I associated with this problem? What opinion do I have? Why do I think this? What would I do in this case? What CT skills I might need to tackle the problem? What CT dispositions I might need to tackle the problem? How difficult do you think it is to solve this problem? How much effort and time is this problem worth? What is the reason/ goal for engaging in extended and careful thought of this problem?	Individual	Self-regulation Analysis Explanation	
	Indicate possible solution/suggestion & argumentation	Explicitly indicate your intuitive suggestion/solution. Argue to support this suggestion/solution.	Plenary	Analysis Explanation Evaluation Self-regulation	Truth-seeking Open-mindedness Analysis

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	Reflection	Why are you in favour/against the solution/suggestion? Do we agree with each other? Do you think that the arguments were sufficient? What assumptions might be related to each argument? What difficulties might be related to each argument? What CT skills did you trigger so far? What CT dispositions did you trigger so far?	Individual	Interpretation Analysis Explanation Self-regulation	Truth-seeking Analysis Cognitive Maturity Self-confidence
	Identify missing information	What do I need to know more, for a sufficient argumentation? What do I need to know more to provide alternative suggestions/solutions?	Group/ Plenary	Explanation Inference Evaluation	Truth-seeking Inquisitiveness Open-mindedness
	Look for evidence	Collect the information, using any source available	Group	Inference Evaluation	Truth-seeking Inquisitiveness Systematicity Open-mindedness
2nd session	Synthesis of information	Present your results from enquiry	Plenary	Analysis Inference Explanation Self-regulation	Cognitive Maturity Self-confidence Analyticity Open-mindedness

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	Decide on a solution to the problem/or the best possible suggestion if the problem cannot be solved	Consider the information provided in the plenary Decide on the best course of action Evaluate the course of action	Group/ Plenary	Explanation Evaluation Self-regulation	Cognitive Maturity Self-confidence Analyticity Open-mindedness
	Reflection	How am I thinking about the problem now? What opinion do I have now? What questions do I have? Do I have all the information needed to provide an alternative solution/suggestion? Is my current solution/suggestion in line with my intuitive solution/suggestion? What has changed during this decision making process? What CT skills did you trigger so far in the problem solving process? What CT dispositions did you trigger so far in the problem solving process?	Individual	Analysis Explanation Self-regulation	Truth-seeking Analysis Cognitive Maturity Self-confidence
	Transfer through analogy (could be an assignment for assessment)	Discussion about other but related problem Provide a solution/suggestion to a new problem Describe the steps you will follow to solve the problem	Group/ Plenary/ Individual	All CT Skills	All CT Dispositions

Learning scenarios for English as Foreign Language (EFL)

Scenario 1: Student-centered learning in the remote classroom

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AIM: By developing teachers' media and information literacy competencies as well as CT teaching strategies, skills, methods and approaches raise a clear understanding of the affordances of technology and how it can link into language learning in the remote classroom.

Objectives: The course will indicate how technology can promote collaboration and allow learners the opportunity to work simultaneously and receive and give feedback, encourage independent learning and autonomous research, personalise home learning, provide a wealth of ideas for remote teaching, retrieval practice and how to blend synchronous and asynchronous learning by learning to use and create audio, video content and images in order to trigger students' creativity and critical thinking and develop their individual speaking, listening, reading and writing skills.

Programme activities:

Title	Duration (in academic hours)				
	Theory	Practice	Self-study	Total duration	Resources
Session 1: Online teaching: Where to start?	1	2	1	4	Edmodo, lyricstraining.com, Edmodo polls
Session 2: Promoting critical thinking, collaboration, creativity and formative assessment using any device in and out of the classroom (Part 1)	1	2	1	4	Office Lens, Seesaw, Wheelofnames, Padlet, Flipgrid, Jamboard,
Session 3: Promoting critical thinking, collaboration and creativity and formative assessment using any device in and out	1	2	1	4	Yoteachapp.com, Socrative, Google Forms
Session 4: Creating self-marking tests using free web-based tools, reducing teacher workload,	1	2	1	4	Mentimeter, Quizlet, Quizziz, QR codes, Screencastify, Mote, Edpuzzle

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facilitating formative assessment opportunities and providing learners with effective feedback					
Session 5: Promoting listening and speaking skills through creativity and critical thinking	1	2	1	4	SpeakPipe, Recordmp3online.com Use Voice Typing in Google Docs, Flipboard, Google Keep, Wakelet.
Session 6: BYOD Educational podcasting for promoting oracy with Anchor	1	2	1	4	Podcasts
Session 7: Use Book Creator to produce and share personalised multimedia eBooks for iPads, Android and Windows 8/10 tablets or laptops which promote creativity, critical thinking, collabouration and facilitate feedback featuring	1	2	1	4	Book Creator, Adobe Spark video, Remove.bg, Storyboard That
Session 8: Promoting creativity and critical thinking with talking avatars, filmmaking and using animation	1	2	1	4	IMGPlay and PicsArt Animator, TextingStory, Pic Collage
Session 9: Purely asynchronous remote teaching ideas for developing speaking, listening, reading and writing	1	2	1	4	English Revealed https://www.englishrevealed.co.uk/ Benedict Arnold Reading comprehension native material https://mrnussbaum.com/games/language-arts-games Gramma of Doom https://www.english-online.org.uk/games/gamezone2.htm ESL Games https://www.eslgamesplus.com/fun-games/ English Club - Games https://www.englishclub.com/esl-games/grammar/adjecti

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					ves.htm Native Activities CLIL https://www.arcademics.com/ Proficiency native English word quiz https://www.merriam-webster.com/word-games Children - Vocabulary and Grammar activities https://www.gamestolearnenglish.com/
Session 10 : Presentation of lesson plans	1	2	1	4	Teachers' lesson plans Feedback of the course
Session 11: Final practical conference of attendees' sharing good practices "Learning by Doing"	0	10	0	10	Attendees' presentations
Total	10	30	10	50	

8. Devices

Computer, speakers, microphone, smart device, tablet, internet, screen

9. List of literature and other information sources used to prepare the programme

English Revealed https://www.englishrevealed.co.uk/ Benedict Arnold Reading comprehension native material https://mrnussbaum.com/games/language-arts-games Gramma of Doom https://www.english-online.org.uk/games/gamezone2.htm ESL Games https://www.eslgamesplus.com/fun-games/ English Club - Games https://www.englishclub.com/esl-games/grammar/adjectives.htm Native Activities CLIL https://www.arcademics.com/ Proficiency native English word quiz https://www.merriam-webster.com/word-games Children - Vocabulary and Grammar activities

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https://www.gamestolearnenglish.com/ ; www.zoho.com; www.padlet.com; www.answergarden.com; www.edmodo.com; www.adobespark.com

Scenario 2: The second learning scenario for EFL in English Language Didactics

Course Unit title	Code
English Language Didactics	

Study Cycle	Course Unit level	Course Unit type
1st cycle	1/1	Compulsory

Aim of the Course Unit: Programme competences to be developed		
The purpose of the course unit is to develop the students' general and subject-specific competences of the study program: ○ **General competences: competence of critical thinking for analysing and reflecting the knowledge gained and relating it to completion of practical tasks; competence of autonomous learning.** ○ **Subject-specific competences: ability to apply and develop traditional and action-oriented EFL teaching methods, strategies; and techniques; ability to adjust the methods, teaching content and materials according to the audience's needs.** **Overall Scenario: students are members of a university research team of educational scientists. Their aim is to prepare theoretical and practical guidelines for teaching higher order critical thinking of students in the English language classes at the level of secondary education.**		
Learning outcomes of the Course unit	**Teaching and learning methods**	**Assessment methods**
Learning outcomes resulting from the general competences as follows:	*Active learning methods*: interactive lecture including brainstorming, group discussion, team project presentations, discussion, debate.	Accumulative assessment: Task/ activity teaching demonstration,

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- **The students will be able to relate theoretical knowledge to practical skills.** - **They will develop an ability to organize their work autonomously as well as keep track of deadlines and time.** - **They will acquire an ability to self-assess their personal achievements properly.** - **They will be able to demonstrate and develop their critical thinking skills, communicate and cooperate with all the participants of the study process, work in pairs and teams.** **Learning outcomes resulting from the subject-specific competences as follows:** - **The students will acquire theoretical and practical knowledge on traditional and action-oriented EFL teaching methods, strategies and techniques.** - **They will acquire an ability to choose, adjust and apply the methods according to the audience's needs, to different learner types and styles.** - **They will manage to provide feedback and self-reflect their performance.**	Student's reflection evaluating the learning environment, analysis of one's academic achievements and improvement of academic knowledge and skills.	A Reflection Essay writing Final project preparation in the form of a group presentation.

Monthly course planner

	Class 1. Theory to practice	**Class 2 Practical application: research project** **Scenario: students are members of a university research team. Their aim is to propose methodologies about teaching disinformation discourses in**	**CT skills**

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		the classroom, by researching the nature of disinformation and debating about children's exposure levels to disinformation on the social media.	
Week 1	Topic 1: "Implementation of action-oriented approach: in the classroom to develop students' critical thinking." Task/ activity preparation for teaching practice, discussion, and reflection.	**Project activity/Stage 1:** Project title "Teaching about disinformation discourses in the classroom" (Group activities: brainstorming data collection, analysing examples of disinformation, defining the key concepts of *disinformation* and *discourses*) **Debate motion 1**: "THB that social media is exposing bad information strategies."	Research skills Analysis Synthesis Interpretation Evaluation Argumentation Debate Reflection
Week 2	Topic 2: "Critical thinking and its development: the structure of arguments. How to make students become better critical readers and critical writers. " Task/ activity preparation for critical reading and critical writing teaching practice, discussion, and reflection.	**Project activity/ Stage 2:** "Teaching about disinformation discourses in the classroom" (Group activities: discussing methodologies, using a methodology in practise, coding a data sample) **Debate motion 2**: "THB that social media hurts children both physically and mentally."	Research skills Analysis Synthesis Interpretation Evaluation Argumentation Debate Reflection
Week 3	Topic 3: "Classroom discussion in the language classroom: How to structure and monitor classroom discussion and conversation." Moral dilemma discussion, and reflection.	**Project activity/ Stage 3:** "Teaching about disinformation discourses in the classroom" (Group activities: discussing the findings, comparing results, drawing conclusions, discussing future implications) **Debate motion 3**: "THB that teaching about disinformation discourses can develop critical thinking skills."	Research skills Analysis Synthesis Interpretation Evaluation Argumentation Debate Reflection

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Week 4	Topic 4: "Language teaching and creativity: Teaching English through the visual arts, theater, and poetry to foster students' critical thinking." Task/ activity preparation for teaching practice to foster students' creativity and critical thinking, discussion, and reflection.	**Project activity/ Stage 4:** "Teaching about disinformation discourses in the classroom" (Group presentations of the students' projects "As a teacher, how I will teach about disinformation discourses") **Reflection session:** What have we learnt about disinformation discourses? How will their teaching contribute to developing CT skills? What are the benefits of debate?	Research skills Analysis Synthesis Interpretation Evaluation Argumentation Debate Reflection

Assessment strategy	**Weight %**	**Deadline**	**Assessment criteria**
A 30 minute teaching demonstration of a task / activity to develop critical thinking	100%	At the end of the month	*The teaching demonstration task should be based on one of the four topics and should contain the following 5 parts and be approximately 30 minutes in length:* 1. *Introduction: description of the main goal of the task /activity and their overall objectives.* In this part the goals: to develop students' critical thinking and subject-specific skills of a chosen teaching task /activity should be described: what students' subject-specific skills are to be developed alongside the development of critical thinking skills: ➢ grade level/language proficiency level of the task/ activity ➢ the main goal: critical thinking skill development: the main *theme* of the tasks/ activity and its link with critical thinking skills ➢ subject-specific skills development within the context of the chosen *theme*:

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			specific students' skills involved: speaking, writing, listening, reading, mediation a *grammatical item(s)* to be presented *vocabulary items* planned to be taught ➢ teaching methods used (e.g.: group/ team work, pair work, case studies, etc.) ➢ the expected learning outcomes ➢ evaluation criteria/rubric 2. *The methodological basis of the lesson.* Relation of the task/activity performance to an action-oriented approach to develop students' critical thinking. Making reference to (preferably two authors' articles) research papers describing an action-oriented approach and critical thinking development. 3. *Description of the task/ activity procedure.* In this part students are expected to present the following: ➢ teaching materials to be used (authentic listening and/ or reading texts, textbooks, etc.) ➢ stages of the implementation of the task/ activity ➢ the teacher's and the students' roles in the task / activity 4. *Teaching the task / activity.* After the explanation of the theoretical background and procedure of the task /activity, the teaching demonstration should be delivered with group mates as students. All the necessary teaching materials should be prepared for teaching demonstration. 5. *Conclusion and Feedback from Classmates.* A short survey to get feedback from classmates on teaching demonstration.

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Learning scenarios for Business and Economics

Scenario 1. Study Case: Understanding the concept of Inflation

Time period: 2 seminars (4 h)

Teaching approach: Social – constructivist

CT teaching approach: Hybrid (Infusion and Immersion)

Learning environment: F2F/Virtual meeting. We shall use didactic materials like dynamic presentations, case study handout, handouts with all the theoretical details (focus being on the practical side), specific platforms dedicated to the banking products (savings & investment) – where the participants are challenged to find the correct & relevant information, pre-session e-learning sessions with the theoretical and technical characteristics of our banking products.

Learning outcomes: Understanding of the concept of Inflation through CT skills enhancement with the purpose of understanding its logic & impact (to realise its threat, but also to discover ways to minimise it and to offer proper solutions to our clients).

The trainer starts with the Study Case on a handout – without revealing its purposes/theme. The trainer's approach is to engage as a guide for the participants, in discovering the information and solutions, so that they can assimilate the details in an easier way.

Case study handout content: *"James is very happy because he received 100 Romanian bill from his grandma on the 2019 New Year's Eve. He decides on 1st of January 2020 to put this bill in his favourite book and to just leave it there, in the bookshelf, as a saving method.*

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- *One year later, when he returns to his bookshelf & finds the same bill in his favourite book. But even if he still has today a 100 Romanian bill, he cannot buy the same quantity of products as last year. Why is that?"*

They deduce that the issue in question is the lowered purchasing power, therefore the increase of inflation. In the light of this discovery, the trainer challenges the participants to search on the web - *which was the average inflation rate last year?* (enhancing curiosity and truth seeking skills). Then, the trainer challenges the participants to calculate mathematically how dthe 100 Romanian bill effectively decreased in purchasing power (calculus & analytical skills). Then they debate the result and impact – profit/loss.

After deciding the quantity of loss, the trainer challenges a debate to generate solutions - *What could he have done differently last year, on 1st of January, to have a different outcome?*

Following this question, the participants start proposing different banking products/services in the savings & investment domain – each product being analysed in detail regarding James's situation (calculus, analysis, research, comparison between products, understanding the financial relativity, how to preamp volatility etc) using the same teaching approach as above.

Scenario 2: How to choose content for a lesson in Economics

Time period: 1 seminar (2 h)

Teaching approach: Social – constructivist and cognitivist

CT teaching approach: Infusion

Learning environment: Face to Face

Learning outcomes: Students will be able to construct good classes. In order to do this, they should be able to do the following:

1. choose learning methods according to class composition (research psychological and cultural settings), level / cultural and social economical context, social status /knowledge level and students' expectations

2. choose content according to all the above

3. all lesson parts should be coherent

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4. evaluate and set criteria (make criteria not just take them from scholarly docs)

5. applying on a sequence of a lesson, different lesson types, all the way to a whole lesson plan

6. if necessary, decide to improve teaching activity (considering that they will not have the same pupils next year)

Evaluation and transparency:

At the beginning of the activity, teacher will give to the students 3 ranking scales concerning the CT skill involved in the activity and in the end of the activity the teacher will show them how they've performed.

The ranked sub-skills or sub-dispositions are displayed in the order of importance given by the teacher.

CT skills / disposition involved:

- **interpretation and analysis** of the prescribed curriculum, content, and suggested methods.
- **Evaluation** of the current situation (who are the pupils in their class, what do they want and what are they able to do?)
- **Self-evaluation and open mindedness**

The skills and dispositions are **gradually evolving** from reading and opinionizing on class content.

Educational need:

Students have problems on all levels, but especially related to the fact that they do not question and they do not have the propensity to challenge the mainstream theories and status quo.

Choosing content - a key factor to a good lesson

It is difficult because students think that everything is important, and cannot evaluate, make an informed choice on what pupils absolutely have to know and what they can learn themselves.

It is difficult because it is in the syllabus and in the manual. And that they learnt the same things when they were pupils, and they learn the same staff in the faculty. They do not question content now, why they are learning

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exactly such theories and no other. Are there other theories / perspectives, anyway?

CT approach: Infusion

Setting 1. Reading and selecting content

- take the 10th grade Economics manual and pick a lesson

- reading, analysing and interpreting the content of a lesson from the manual

- choose what to teach in 50'. Decision making and justification of the choice

- present it to your colleagues

CT skills involved: interpretation & analysis & explanation

Setting 2. Re-evaluation of selected content

- feed-back and new input: the content is too rich (usually); it will not be enough time to teach and consolidate in 50'

- re-evaluate the content: essential, key-points, needed info for the pupils to become independent readers.

- decision making and justification of the choice – recurrent task

CT skill involved: evaluation

Evaluation activity, validation by colleagues (collaborative work and making the consensus). Concept map of the selected content. The whole class participates to design the concept map of the lesson. This map should demonstrate logical accuracy on representing main concept of the lesson, logical links between main concept and supported key concepts.

Setting 3. Matching methods and content

- selecting and arguing why a method is good – decision making and arguing – recurring

CT skill involved: problem solving

Setting 4. Possible scenarios of content delivery (open-mindedness)

- what student expect from the pupils to learn?

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- what could be a success?

- what could go wrong?

- what "wrong" means for the selected content?

CT skill involved: Open-mindedness

Evaluation:

Assessment of the whole activity: qualitative assessment, made by the teacher, and not an assignment for the students. The teacher will check the following criteria:

Skill: Analysis		
Ranking (importance)	**Description and criteria**	**Check**
1	Identify the intended & actual inferential relationships among statements	□
2	Make judgments	□
3	Write questions, concepts, descriptions, or other forms of representation intended to express belief,	□
4	make observations about the general idea or the general purpose of the lesson	□

Skill: Interpretation		
Ranking (importance)	**Description and criteria**	**Check**
1	Decode significance To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria	□
2	Clarify meaning	□
3	Categorize	□

Disposition: Open-mindedness

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Ranking (importance)	Description and criteria	Check
1	Sensitivity to personal bias	□
2	Tolerant of divergent views	□
3	Valuing tolerance	□
4	Understanding of the beliefs of others	□

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Learning scenarios for Business Informatics

Scenario 1: (Scientific) Writing and Creativity

Themes, concept and aims

Students supposed creativity methods and both academic and technical writing and learn how to apply creativity skills in writing.

After the course the students understand that creativity is something one can learn and that professional creativity requires knowledge and CT skills. Additionally, they will learn how to structure the text, how to write effectively.

The course is 2,5 credits, i.e. 13*1,5 hours lecture + homework + exam

Teaching approaches: In this course multiple approaches will be applied (a behaviorist, a social constructivist, Rational/cognitive, personal approach). To train CT skills, the hybrid approach will be applied (immersion + infusion). The course can be run online or in blended mode.

Course materials: presentations, scientific papers to be analysed, other materials that introduce technical and scientific writing and various creativity methods.

Learning outcomes: Learn creativity methods and apply them in scientific writing

Most suitable content: The central aspect: Both the creativity and the writing can be learned effectively.

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Suitable Methods: self-reflection, pair and group work, analysis of structures, review of papers, discussions.

Description of the class: Introduction: something that motivates the current topic, maps it to the course topics (Advanced Organizer), a short exercise, an introduction into the topic, example, exercise, discussion about the results, sum up, next topic. Various formats are suitable.

Timeline: Once in a week 1,5 hours lecture, 14 weeks. 4-5 weeks are planned for the teaching of creativity methods; the rest is for the scientific and technical writing. The homework takes about 3-4,5 hours per week.

Sessions	outcomes	Content	Methods	Evaluation / feedback
1	Creativity	What is creativity and what is needed for it	Presentation, discussion, various tasks + pair work, reflection of feelings	Self-reflection (self regulation, truth seeking, open mindedness, self confidence, interpretation, inquisitiveness)
2	Creativity	Creativity methods	Presentation, texts, pair work, reflection of feelings	Self-reflection (self regulation, truth seeking, open mindedness, self confidence, interpretation, inquisitiveness)
3	Creativity	Creativity methods	Presentation, texts, pair work, reflection of feelings	Self-reflection (self regulation, truth seeking, open mindedness, self confidence, interpretation, systematicity, inquisitiveness)
4	Creativity	Creativity methods	Presentation, texts, pair work, reflection of feelings	Self-reflection (self regulation, truth seeking, open mindedness, self confidence, interpretation, systematicity, inquisitiveness)
5	Writing (understanding what	What is writing, the function of writing,	Presentation, texts, pair work, reflection of feelings,	Self-reflection (self regulation, truth seeking, open mindedness,

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	is writing + research process)	the role of writing in the research process	panel discussion (own experiences)	self confidence, interpretation, Analyticity, Systematicity)
6	Writing (planning the writing process, mental aspects of writing)	Phases of text production	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences)	Creating a plan for a writing task (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, Cognitive maturity)
7	Writing (Document structure, types of documents)	The sections in a scientific publication + their functions	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Analyze the structure of publications and check, if the text fulfills its function. (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, inquisitiveness)
8	Writing (Elements of a document Abstract + Introduction)	The sections in a scientific publication + their functions	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Analysis of various approaches to write an abstract and introduction with examples (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, inquisitiveness)
9	Writing blockades	Strategies to avoid or to overcome writing blockades	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Self-reflection (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, inquisitiveness)
10	Technical writing	Technical communication and the audience	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Various tasks (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, inquisitiveness)
11	Technical writing	Applications of technical communication	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Various tasks (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity,

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				Systematicity, inquisitiveness)
12	Technical writing	Applications of technical communication and professional communication	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences), examples	Various tasks (self regulation, truth seeking, open mindedness, self confidence, interpretation, Analyticity, Systematicity, inquisitiveness)
13	Summary			

Final Examination: Presentation, scientific review of a publication, analysis of the structure of an abstract, reflection about the course – what I have learned, how this course has changed my thinking.

Scenario 2: Economic Aspects of Industrial Digitalization

Themes, concept and aims

Caused by the digitization of society, the boundaries between countries and cultures increasingly lose their importance. This shift may be noticed at the organizational and at the individual level. Consequently, organizations, businesses, governments and individuals face novel opportunities and challenges caused by the digitization of products and processes. The digitization process is a challenging change for all stakeholders. This change needs to be managed to be successful. This course deals on the one hand with change management of the digitization in organizations and businesses and on the other hand with links and dependencies between digital technology and organizational digitization as well as their effects on the economy, society, organizations and individuals.

The course is 2,5 credits, i.e. 13*1,5 hours lecture + homework + exam

Teaching approaches: Various approaches will be applied (a behaviorist, a social constructivist, rational/cognitive, personal approach). To train CT in this

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course, the hybrid approach will be applied (immersion + infusion). The course can be run online or in blended mode.

Course materials: presentations, scientific papers to be analyzed, books, current online articles and other material that deals with the change of the society and economy due to digitalization.

Learning outcomes: After this course the students should understand processes that are connected with the digitalization of the society and economy, understand the motivation of the digitalization and its effects on multiple levels, create a business model for a start-up company that rides on the digitalization.

Most suitable content: understand the change and the driving powers for the digitalization and its consequences, structure and function of a business model.

Suitable Methods: self-reflection, pair and group work, analysis of structures, review of papers, discussions.

Description of the class: Introduction: something that motivates the current topic, maps it to the course topics (Advanced Organizer), a short exercise, an introduction into the topic, example, exercise, discussion about the results, sum up, next topic. Various formats are suitable.

Timeline: Once in a week 1,5 hours lecture, 13 weeks. 4-5 weeks are planned for the teaching of creativity methods; the rest is for the scientific and technical writing. The homework takes about 3-4,5 hours per week.

Sessions	outcomes	Content	Methods	Evaluation / feedback

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1	Industrial revolution	Overview of the industrial revolutions their triggers and impacts	Presentation, discussion, reflection of feelings	Discussion
2	Industrial revolution	Impacts of the industrial revolutions in the society	Texts, discussion	discussion
3	Organization as a system	Consideration of an business organization as a system of components	Texts, presentation	discussion
4	Organization as a system	Consideration of the system components in respects of the possibilities of digitalization	Texts, presentation	discussion
5	Business model	Understanding the function and the structure of a business model	Texts, presentation, discussion	Report + presentation of own business model (self-regulation, interpretation, truth seeking, systematicity, inquisitiveness)
6	Electronic Business	Introduction into E-Business	Presentation, texts, pair work	Discussion, report (self-regulation, interpretation, truth seeking, systematicity, inquisitiveness)
7	Electronic Business	Introduction into e-Business	Presentation, texts, pair work, reflection of feelings, panel discussion (own experiences)	Report (self-regulation, interpretation, truth seeking, systematicity, inquisitiveness)

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8	Business Processes	Introduction into business processes	Presentation, texts, pair work, students examples	Discussion, generation of own examples (self-regulation, truth seeking, interpretation, inquisitiveness)
9	Digitalization of the Production Processes & MES	MES Functions, Automatization, Digital pair, Organization of the production process	Presentation, texts, pair work	Self-reflection (self-regulation, truth seeking, interpretation, inquisitiveness)
10	Digitalization of the Supply Chain & ERP	ERP, Supply Chain, Marketing, Procurement, interoperation organizational components	Presentation, texts	Discussion (self-regulation, truth seeking, interpretation, inquisitiveness)
11	Digitalization and society	Changes on the job market, Potentials and risks, Educational needs, Requirements for the citizens	Discussion, Presentation, texts	Discussion (self-regulation, truth seeking, interpretation, inquisitiveness)
12	Digitalization and society	Changes on the job market, Potentials and risks, Educational needs, Requirements for the citizens	Discussion, Presentation, texts	Discussion (self-regulation, truth seeking, interpretation, inquisitiveness)
13	Summary			

Final Examination: Presentation of an own business model + business model documentation, short exam.

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Learning scenarios for Veterinary Medicine

Scenario 1– [Veterinary Medicine] Clinical courses

[activity will be designed to be used in different courses tackling different species and different specialties within the Veterinary Programme]

Case-based learning in clinical courses

Themes and concepts:

The main concept of this learning scenario is that by engaging students in the analysis of clinical scenarios retrieved from every-day practice in the veterinary hospital settings and to solve the health problem in an animal using high level reasoning, and guided questioning as scaffolder, will contribute to the development of critical thinking skills.
The case-scenario to be used is left blank purposely to allow the teacher to select specific cases to match the syllabus of their courses, in different species clinics or in different clinical domains/specialties (e.g, Gynecology and Obstetrics, Infectious Diseases, Ruminants Clinics, Small Animals Clinics, Surgery in Companion Animals). The elements to be included in the case-scenario and the steps of the activity will follow the medicine model (ten Cate O, van Loon M. Writing CBCR Cases. 2017 Nov 7. In: ten Cate O, Custers EJFM, Durning SJ, editors. Principles and Practice of Case-based Clinical Reasoning Education: A Method for Preclinical Students [Internet]. Cham (CH): Springer; 2018. Chapter 8. PMID: 31314459).
These activities will be complemented with clinical rotations [to be detailed elsewhere] that will allow to explore autonomy in medical procedures (e.g., collection of clinical history, performing and analyzing complementary exams technics, such as blood testing and imagiological exams, discussion of therapeutic approaches with animal owners, and other smaller entrustable professional activities mimicking those performed during external traineeships). In the smaller/basic entrusted activities to be developed in clinical settings, students will work on communication, empathy, inquisitiveness, systematicity, autonomy and self-confidence, as well as self-assessment.

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Aims:

These learning scenarios will be designed to support the development of CrT skills and/or dispositions supporting the switch in students' reasoning from a disease- or system-based thinking into a patient-based thinking and train the medical decision-taking for problem solving.

The cases will be worked together with the labour market partners. A common framework to analyse and process throughout the cases will be used across the different courses engaging in this activity. The cases to be used will cope with the particular syllabus of each Course. This would embed the development of critical thinking into the field-specific knowledge.

The situation analysis and resolution will be guided by a common questioning based on the Frisco-guidelines (Ennis, 1996).

By creating a common framework to be adapted to day-to-day (hospital settings – alike those of traineeships) or topic-related case-scenarios (clinical cases) to be used in clinical courses across the curriculum, each teacher would be able to present the case best fitting the topic on a particular week.

Time period:

The activity is time-limited to a short period (a lesson of 3h or 2x2h) and will be repeated twice or thrice through a semester.

The case-based scenarios would be designed in particular for the 4th and 5th years of the Master's programme.

Teaching approach:

The activity will follow a social-constructivist approach

The methodology to use is case-based learning. The Course runs mainly (on presential education)/face to face, albeit some support may be provided in a

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blended approach (for instance, to reinforce the mention of developing critical thinking).

The present activity was designed to be used in the classes of the clinical field Courses, and to be complemented with small entrustable activities (hands-on in clinical procedures) to be performed during internal/intramural internships, matching the current approach used in the curricular traineeships in clinical settings (labour work partner). The latter will be detailed in the OT2 working files. Here, some examples will be provided in the table depicting the steps of the activity (text in grey).

The students will work in groups (around 5 students when in-class; in pairs when in hospital settings) – collaborative learning.

CrT teaching approach:

The CrT development will follow a hybrid approach (both immersion and infusion are possible)

Content specific:

The cases to be used will cope with the particular syllabus of each Course. Therefore, Educators will be able to fulfil the knowledge identified in the course syllabus while also fostering students CrT skills or dispositions.

CrT skills and dispositions:

The case-based learning activities will allow to develop different CrT skills and dispositions, namely: Interpretation, analysis, inference, evaluation, explanation, and clarity and self-regulation.

The skills may be differently combined in different Courses, according to the Programme Degree/year in which students are enrolled.

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Course materials:

The following course materials are planned:

1. Recommended scientific or academic publications (for background and specialty-specific knowledge)
2. Activity- proper:
   - Regulatory document for each activity (delimiting the topic, defining the learning outcomes and requirements, estimating the timeline to prepare/develop the activity, which outputs must be submitted for assessment, presenting the rubrics to assess critical reasoning/ critical reflection on the activity)
   - Case – scenario or problem description (partial and to be presented step-by-step after discussion with the tutor of the activity according to the guiding questionnaire)
   - The guiding questionnaire
   - Additional information pertinent to the case analysis and to follow the situation till its resolution/proposed solution

Activity step by step			CT skills	CT dispositions
Step 1	Presentation of the patient problem	Depicting the patient's initial story, question, complaint, or evident symptoms before history taking.	Interpretation Inference	Systematicity Cognitive maturity
		Identify the focus of the problem		
		Provide all the hypothesis that may be associated with the problem [I: likely, II: less likely, III: not very likely]		
Step 2	Which questions should be asked to discriminate between the most relevant hypotheses	In the clinics internship this step can be worked as an entrustable activity [train communications; adapt the type and amount of information to collect to a particular case; evaluate the	Inference Evaluation	Communication Autonomy Evaluation Inquisitiveness Open-mindedness

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		quality of information retrieved] Query differential diagnoses Assess the quality of the information collected		
Step 3	[The teacher provides the clinical history information]	How does this information influence the differential diagnosis?	Analysis Interpretation Evaluation	Cognitive maturity Analyticity Systematicity
		Rank the most important information according to the value to raise the differential diagnostic list		
		Contrast the diagnostic approaches		
Step 4	Provide additional information on request	Which parts of physical examination are required, in order to exclude some unlikely, but important hypotheses?	Analysis Interpretation	Systematicity Analyticity Communication True-seeking
		[perform the physical exam in the animal]		
		How did the findings contribute to redefine the diagnostic list	Interpretation Evaluation	
		Which additional exams are necessary to confirm the most likely hypothesis and to discriminate between others?	Analysis Interpretation Evaluation	
		Interpret the findings from the Diagnostic Tests	Evaluation Inference	Analyticity
		Which hypotheses were discarded from the additional information gathered? Which is your diagnosis?	Interpretation Inference	Analyticity
Step 5	Therapeutic options	Given this diagnosis and patient circumstances, which therapy is now indicated?	Analysis Evaluation Interpretation	Analyticity Cognitive maturity

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		Select the most suitable treatment for that particular situation (consider the animal background, animal problem, co-related health issues, etc.)		
		Identify arguments to support the selected therapeutic options using a SWOT matrix	Analysis Evaluation Explanation	
		In clinics internship/settings this step can be worked as an entrustable activity [train communications with the tutor [role-playing can be used); explain the rationale behind the selection of the therapy and ensure the tutors compliance; explain the expected results and how the follow up will be implemented]	Explanation	Communication
Step 6	Schedule the follow-up	What is your prognosis? Discuss it with the teacher/trainer		
		When do you expect to see the results of the treatment	Inference Explanation	Systematicity Analyticity
		What will be the changes expected and the timeline for those changes		
		When should the animal be observed for the condition improvement		
Step 7	Metacognition	Revise your reasoning: verify your diagnosis	Inference Self-regulation Metacognition	Analyticity Open-Mindedness
		[check the animal records – are they clear and complete – do they support the transfer of the case		

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		between colleagues? Does it support the final diagnosis?]		
		Suppose that the animal fails to show health improvements. What could have been wrong		
		Which is the anticipated critical point in the animal´ tutor compliance [time in treatment; effort; costs of treatment; failed expectations for the animal value]. Can you mitigate them?		

Assessment:

In the final stage of the activity, students should submit a document detailing the reasoning, which should also include the rationale for the requested additional information and the complementary exams interpretation. At the end, a critical reflection on the activity will be requested.

This document should be submitted within a 48h interval. It will be assessed using a rubric for the evaluation of the quality of reasoning.

Notes:

This activity will be complemented with tasks and trustable medical activities directed to the development of procedural competences and CrT dispositions. These activities will be included in the intramural training where students accompany the daily routine of a veterinary hospital. Some of those activities are presented (but not limited to) in the activity table, and can be evaluated using logbooks, portfolios and performance assessment (OSCE or similar).

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Scenario 2 – [Veterinary Medicine] Public-Health related courses

[activity was designed to be used particularly in the Preventive Medicine Course of the Veterinary Programme]

Project-based learning

Themes and concepts:

Problem-based learning (PBL) is a student-centered pedagogy that provides learners with more opportunities for application of knowledge acquired across the curricula to the working situations than the traditional lecture-based learning. This is a particularly attractive approach in courses dealing with a wide range of situations that drain from distinct fields, as it is the case of Preventive Medicine.

In this learning scenario Students are engaged in the analysis of an official/authentic dataset containing information about the results from the infectious diseases eradication/control programs (in a year range of about 4 years) in different farm species. The dataset contains coded information for the animals (species, age group, reproductive status, screening diseases and results of the analysis) and farms (farm, geographic location and georeferencing data, among others) obtained as part of a diagnostic process (post-mortem assessment).

Preparing veterinary professionals in animal health promotion and disease prevention is an essential step for either the animal health and wellbeing and the human health, by the production of healthier food and by preventing zoonosis. Also, in promoting an integrated and sustainable production system with minimal environmental impact and compliance to National and International standards (Animal Welfare and prudent use of antimicrobials).

Aims:

The problem-scenario is designed to support the development of critical thinking skills and/or dispositions in students in the field of infectious disease prevention. The project aims to introduce students to public health and preventive medicine practice and develops students' literature searching,

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writing, presentation skills, and teamwork. This would allow the development of critical thinking into the field-specific knowledge.

The activity includes the examination of data concerning diseases diagnosed (with and without laboratory confirmation) in different national regions and the analysis of disease trends at the species-population level; the detection of a putative epidemic centre/outbreak and the identification of associated risks; and knowledge of the eradication or control strategies and programs (both National and International), as well as the role of the veterinarian in those systems and programs.

Time period:

The activity will be developed through the entire semester (14 weeks), in the 5th degree of the Veterinary Medicine Programme, in the Course of Preventive Medicine. Through the project, students must develop their understanding of theory and practice of Preventive Medicine, and of other courses located previously in the Programme (such as Public Health, Infectious Diseases, Parasitic Diseases, Clinics, Epidemiology, and Animal Production).

The activity will develop within the practical classes' timeframe.

Teaching approach:

The activity will follow a social-constructivist approach as proposed by Wilson (1996).

The methodology to use is problem-based learning. The Course runs in a blend/mix approach, albeit some contact sessions are previewed (for instance, to track students´ difficulties and avoid dispersion or unsuitable/deviated solutions).

The students will work in groups of 5-6 elements – collaborative/cooperative learning as Morton Deutsh described in the 1940s' "each student is responsible for contributing to the group knowledge". The group defines the overall strategy, but each student is stimulated to be creative and use critical thinking skills, building on an individual portfolio to be submitted every week for review and teachers' feedback. The self-directed exploration will be integrated to build the groups work (group sessions held weekly, at practical sessions).

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Content specific:

An original, real-life dataset of hundreds of entries will be made available to students. The data entail comprehensive information of different animal species and putative cause of death (with or without confirmed laboratory diagnosis). Aligned to the course syllabus, theoretical classes will provide opportunities for students to learn more on the Preventive interventions and Health promotion (holistic approach), control plans and further student's inquisitiveness to what information is missing in the dataset while prompting for CrT skills to decide on following steps as means to ensure adequate solution formulation. Georeferencing analysis taking into account region administrative division, climate and landscape particularities enabled by ArcGIS © software.

CT skills and dispositions:

The problem-based learning activities will allow to develop different CrT skills and dispositions, namely: Interpretation, analysis, inference, evaluation, explanation, and self-regulation, as well as open-mindedness, inquisitiveness, self-confidence, systematicity and analyticity.

Course materials:

The following course materials are planned:

1. Recommended scientific, academic publications and National and European regulations (for background and specialty-specific knowledge)
2. Activity- proper:
   - Regulatory document for the activity [defining the learning outcomes and requirements, defining milestones in the activity, the activity products to be submitted for assessment, and the design to follow in the presentation of the solution for the problem defined earlier in the activity, and to the present the assessment rubrics]
   - A database of post-mortem laboratory analysis confirming (or not) a preliminary in-field diagnosis is provided to students. The database contains information of swine, ruminants, equine and case georeferencing

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- Open source maps and data to enable georeferencing and epidemiological analysis
- Additional information pertinent to individual portfolio and the case analysis of each group, furthering the situation until proposed preventive interventions and mitigation plans presented (article and public presentation).

Activity step by step			CT skills	CT dispositions
Step 1	Presentation of the database	Assembly and organization of dataset entries by putative fatal disease/process, confirmed death causality, age groups, frequency of agents involved in disease/death	Interpretation Inference	Open-mindedness Systematicity
		Identify epidemiological problems by species, age-group, process severity, number of animals/livestock producer, season, handling related diseases, possible preventable diseases, location trends (georeferencing)		
		Provide all the hypothesis related to deaths not confirmed by the laboratory analysis [I: likely, II: less likely, III: not very likely]		
Step 2	Setting the theme and objectives	Students analyze the database (aggregating casualties/infectious agents/regions/animal group ages) to ultimately define the relevant problems they (as animal health professionals) would like to address	Inference Evaluation	Communication Autonomy Evaluation Inquisitiveness

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Step 3	Work in the defined problem	Students are asked to search individually and weekly update a portfolio, later sharing their creative process and critical reasoning on information gathered with their group (strengthening group dynamics).	Analysis Interpretation Evaluation	Cognitive maturity
		Students are expected to provide epidemiological context, background on current animal production system, animal health sanitary plans, and to propose preventive approaches, the implementation of practices translated from other systems, and tools to improve health/disease surveillance. These contributions are expected to have two target populations, preparing them for appropriate communication: peers and community (e.g., farmers, lab professionals).		Systematicity
		Each group will have the opportunity for weekly brainstorming sessions and feedback with lecturers to help them keep track on (what, where, why, what for), and also to enable critical analysis on the state-of-the-art towards a sustainable, improved animal health/public health.	Explanation	Communication Analyticity

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		Students are stimulated to be creative and use critical thinking skills, building on an individual portfolio to be submitted every week for review and teachers' feedback. The self-directed exploration will be integrated to build the groups´ work (group sessions held weekly, at practical sessions).	Analysis Self-regulation	Inquisitiveness Self-confidence
Step 4	Presentation of the solution to the problem	Groups are requested to submit an article-type with the work overview and present the theme to peers and teachers.	Inference Explanation	
		At this stage, students should evaluate their own groups' performance while also assessing the other themes presented. This constitutes an additional feedback enabling reflection and consolidation of learned processes		Communication

Assessment:

The assessment of the activity will focus on the reflective portfolio, the final written output and the group presentation. This document should be submitted within a 48h interval of the activity end. It will be assessed using a rubric for the evaluation of the quality of reasoning and proposed prophylactic interventions as part of the solutions to be implemented. The assessment of the activity also contemplates peer-feedback and appraisal combined with self-evaluation grade (individual progress and groups overall performance).

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Scenario 3 – [Veterinary Medicine] Food Safety related courses

[activity was designed to be used particularly in the Sanitary Inspection Course of the Veterinary Programme]

Situation-driven decision-making

Themes and concepts:

To provide quality assurance and safety of food, an integrated food assurance system is needed. Throughout the food chain from the farm to the dinner table, the economic operators should comply with standards that guarantee the production of high-quality safe food, supportive of the customers' health.

The basis of our modern food safety assurance system is a novel approach designed to address potential food safety problems before they actually appear (proactively; preventatively), and at points of the food chain where they are expected to appear. Hazards that may enter the food chain have to be controlled at relevant, multiple points in a coordinated (integrated) way. Those that cannot be completely eliminated, may be reduced. A 'summation effect' of risk reductions may be achieved in longitudinal and integrated systems and by routine screening at specific points of the chain. Inspection of slaughtered animals can provide a valuable contribution to surveillance for zoonotic diseases with major importance under the One Health concept. In this context, ante-mortem and post-mortem inspection can be an important sentinel tool for these and other important animal diseases, despite further diagnostic tests can be applied in the suspicious cases. The official veterinary inspection must be aware of the risks and putative causes for meat or carcass compromise to decide on the approval or rejection of a carcass to human consumption, as well as the final destiny of meat by-products considering its potential risk for human, animals, and environmental health.

In this activity, the students are requested to analyze a scenario retrieved from real work situations and in a step-wised approach reason on the best decision regarding the quality and safety of meat and meat by-products as do Official Veterinary in slaughterhouses.

Aims:

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The scenario is designed to support the development of critical thinking skills and/or dispositions in students and the effective and rational decision-making process, typical of sanitary inspectors working in the field of sanitary inspection. The scenario is designed to train the students in the decision-making process that culminates with the conclusion of whether a carcass meets the criteria for safe consumption and of a quality product. This kind of final decision is taken through a chain of stepwise reasoning approaches, based on the assessment of risk for human health. The decision made also reflects on the destination for the meat by-products, in a way to avoid human, animals and environment contamination.

The activity includes the analysis of a real situation in a slaughterhouse setting, where the student is requested to perform as a sanitary inspector, acting through the different steps of the process of sanitary inspection. The situation is designed to represent a situation of potential risk for public health. To reach the final decision – whether or not the meat can be consumed – the student must pass the stage of the ante-mortem evaluation of the animal, complete the documentation files and other relevant material, and decide whether the animal may be slaughter or should be removed from the food-chain; pass through the post-mortem evaluation, determine the quality of the product and identify the risk for human consumption, as well as the final outcome for meat by-products.

Time period:

The activity will be developed in the final weeks of the Sanitary Inspection course, in the 5th degree of the Veterinary Medicine Integrated Master Programme. Through the activities, students must develop CrT skills to support their decision-making process. The activity will develop within the practical classes' timeframe, in two sessions of 2h each.

Teaching approach:

The activity will follow a social-constructivist approach

The methodology to use is case-based learning. The Course runs an in-presence approach. The students will work in groups of 5-6 elements – collaborative learning.

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Content specific:

Application of the food safety and hygiene regulations (either national and European) in a professional context (sanitary inspection)

CrT skills and dispositions:

The case-based learning activities will allow to develop different CrT skills and dispositions, namely: Interpretation, analysis, inference, evaluation and self-regulation, as well as open-mindedness, inquisitiveness, cognitive-maturity, systematicity and analyticity, and truth-seeking.

Course materials:

The following course materials are planned:

1. Recommended scientific, academic publications and National and European regulations (for background and specialty-specific knowledge)
2. Activity- proper:
   - Regulatory document for the activity [defining the learning outcomes and requirements, defining the activity products to be submitted for assessment, and the time set for the activity, and to the present the assessment rubrics]
   - A copy of documents that must accompany the animal to slaughter (containing the farm identification, its sanitary status, animal related data)
   - A database of images and videos illustrating the animal condition, and the aspect of animal´ carcasses and organs, as well of the corresponding database of additional tests to be requested to support the decision-making
   - Additional information pertinent to the case analysis and to follow the situation till its resolution/proposed solution

Activity step by step	CT skills	CT dispositions

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Step 1	Presentation of the case	Depicting the initial situation in the slaughterhouse facilities Identify the focus of the problem Provide all the hypothesis that may be associated with the problem [I: likely, II: less likely, III: not very likely] Analyze the animal' documents And perform the necessary physical examination	Analysis Interpretation Inference	Systematicity Cognitive maturity
Step 2	Ante-mortem examination 1st decision	Revise the hypothesis and prioritize the most probable cause for the situation Reach a decision on whether the animal will proceed to slaughter and in which conditions Identify the main clinical signs supporting your decision	Analysis Inference Evaluation Interpretation	Systematicity Analyticity
End of the first 2h session [discussion with the teacher] - the teacher may set the student in the correct track, if needed [Explanation; communication]				
Step 3	Post-mortem examination	Determine the existence of lesions (specific or non-specific lesions) supporting or contradiction your sanitary decision– to be discussed with the teacher Determine the need for additional testing to support your sanitary decision [to be asked and discussed with the teacher] Analyze and describe the results of the tests, and discuss how they are	Inference Evaluation Interpretation	Communication Cognitive maturity True-seeking Systematicity

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		supportive (or not) of your initial diagnosis)		
Step 4	Reach the final sanitary decision	Provide a sanitary diagnosis of the problem Identify the risk for public health/quality and safety of meat What is your sanitary decision? Based on your sanitary decision, classify the animal´ by-products	Analysis Inference Evaluation Interpretation	Systematicity Analyticity
Step 5	Presentation of the situation and sanitary decision to peers	Groups are requested to submit a critical analysis of their reasoning process that led to the first decision taking (in step 2 – provisional decision) and of the final sanitary decision, arguing their decision on the base of the national and European regulations Include a draft of the sanitary decision report Students must present their sanitary decision to peers and the teachers before submission of the final report to collect feedback	Self-regulation metacognition	Self-confidence

Assessment:

The assessment of the activity will focus on the critical analysis of the reasoning process and the public presentation of the decision taken.

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The final critical report should be submitted within a 48h interval. It will be assessed using a rubric for the evaluation of the quality of reasoning.

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Part D. Conclusions, limitations, and future steps

After analysing all aspects of teaching CT in higher education and in labour market organisation we can declare that there is no definitive “gap” between HEIs and LMOs. The observed differences rise from different contexts and from different purposes and aims the two organizations have. HEIs try to prepare students for all jobs a domain can offer, and LMOs try to prepare a person for a specific job and organisation.

Thus, HEIs concentrate on career preparation and initial training. LMOs are narrowing competencies, needed for specific work tasks and organisational adaptation. HEIs set long-term goals and they need years to attain them, while LMOs have short-term teaching and learning outcomes. Precaution is required when skill demands for graduates’ employability in the labour market are associated with the skills developed at the university (e.g., Tholen, 2019).

One of the most important findings of this research is that HEIs and LMOs work in parallel, but do not share a common understanding of expectancies or perceptions. This may happen because CT is a recent requirement in the educational landscape (Lipman 1982), thus more time is required to obtain a common language and, more importantly, a common goal between HEI and LMO concerning what it is and how CT should be educated.

It requires a lot of determination to put together agents of education, HEI and LMO, to work for embedding critical thinking at institutional, programme, and course level.

We can only hope that in the next stages of THINK4JOBS project we shall succeed to introduce CT at programme and course levels, using

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intellectual output 3 activities to design and implement three work-based curricula for each participating county and to take the opportunity of intellectual output 4 activities to develop blended apprenticeship curricula using Moodle platform and to further enhance collaboration between HEI and LMO.

Regarding the limitations of the present study, it can be mentioned that the study was qualitative research, highly susceptible to situational and contextual variables. Thus, results cannot be easily generalised, but they can offer a fresh perspective on a little scrutinised domain – critical thinking between higher education and labour market organizations.

Discipline specificities should be considered when reading the present report. There is no uniformity in what is different and what is similar throughout disciplines concerning CT education, except the observation that both HEI and LMO are tackling CT in an implicit manner, and they often refer to the same issues using different concepts of references. Also, cultural specificities could have influenced the results and the suggestions provided in the Recommendation and in the Learning Scenarios sections.

The present report intended to provide a toolkit to be used in the next steps of the project to develop apprenticeships curricula, but also to offer some ideas for teachers, trainers, students, and for other interested readers about how to tackle the problematic educational situation of developing critical thinking for successful jobs.

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