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Experimental Programs of Critical Thinking Enhancement: A Worked-Based, Blended Learning Higher Education Curriculum for Economics

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Abstract: In an increasingly changing world, critical thinking is one of the key skills that ensure organizations' competitive advantage. Thus, in higher education institutions, there is an accelerating emphasis on developing critical thinking (CT) among students. This paper presented the results of three experimental courses (pedagogy and didactics of financial accounting, virtual learning environments in economics, and business communication), using a blended learning method, aimed at improving students' CT skills. The three courses were delivered by both higher education teachers and trainers from the labor market. After analyzing the data from the three experimental courses, it will be possible to assess whether the intervention of labor market trainers contributed to the improvement of students' critical thinking skills, and in particular, at the level of which these component improvements have been identified.

Keywords: critical thinking; higher education; labor market



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1. Introduction

Academics and policymakers emphasize that university graduates often lack the essential soft skills and personal attributes that would enhance their prospects in the job market. At the same time, these soft skills are crucial for equipping graduates to effectively address workplace challenges. Furthermore, existing research underscores the scarcity of Higher Education programs that specifically focus on enhancing graduates' soft skills. Critical thinking (CT) stands out as one of the soft skills that is closely linked to increased employability at higher levels.

We proposed a quasi-experimental research design trying to develop critical thinking among our students, involving three separate classes, during the academic year 2021–2022.

The examination of the outcomes obtained from the three courses, both in the pre-test and post-test stages, involved rigorous analysis. By reversing the scoring of negative statements and performing meticulous calculations, we sought to unveil the substantial changes that unfolded in the realms of skills, sub-skills, and dispositions. Predominantly, the most remarkable enhancements transpired within the domain of skills, with comparatively limited advancements observed within dispositions. This distinction underscores our partial affirmative response to the primary research question (Q1: Is there an improvement of CT self-assessment results after the implementation of CT-blended apprenticeships for all students from all three classes considered together?).

The detailed examination of the results elucidates the most prominent shifts within the skills sphere. Both the overarching categories of interpretation and explanation, and their corresponding subcategories, such as clarifying meaning, assessing claims, stating results, justifying procedures, and presenting arguments, revealed significant changes. This progression was notably attributed to the comprehensive exposure that students

encountered during the courses. They not only engaged with theoretical content but also grappled with diverse real-life cases, amplified by the inclusion of perspectives from labor market representatives. Consequently, their proficiency in interpreting data and information, assessing claims, and presenting coherent arguments demonstrated overall critical thinking growth.

The intricate nature of critical thinking, a psychological phenomenon, renders its enhancement challenging to solely attribute to specific methods or pedagogical approaches. The courses embraced an inquiry-based, constructivist approach, enriched with a diverse array of teaching methods and case studies—attributes intrinsic to labor market-oriented pedagogy. This comprehensive strategy, aimed at fostering both skills and dispositions, yielded discernible improvements in selected facets.

However, it is noteworthy that despite these targeted endeavors, not all dispositions exhibited significant progress. This could be attributed to the intricate nature of these traits, resembling personality facets that necessitate sustained cultivation over an extended duration. The essence of Aristotle's critical spirit, encompassed within these dispositions, requires substantial and prolonged efforts for full development.

Deeper scrutiny of the three pilot courses unraveled distinct disparities in initial scores among students. Notably, disparities were observed in the "Interpretation" skill and "Perseverance" disposition. Post-hoc testing, using the Bonferroni method, confirmed these differences between the pedagogy and didactics of financial accounting course and the virtual learning environments in economics course. Participants in the virtual learning course consistently exhibited higher average scores in both "Interpretation" and "Perseverance" when compared to their counterparts in the pedagogy and didactics of financial accounting course. The progression analysis for the three pilot courses—business communication ($n = 31$), pedagogy and didactics of financial accounting ($n = 32$), and virtual learning environments in economics ($n = 18$)—employed the GLM-Univariate ANCOVA test. However, it is crucial to exercise caution while interpreting these findings, as the assumption of prior equality among groups in the covariate was not consistently met for "Interpretation" and "Perseverance". In essence, while no substantial divergences in critical thinking skills emerged across the three pilot courses, notable variations surfaced within the integrated scores of CT dispositions. This variation was particularly apparent in the business communication and virtual learning environments in economics courses, indicating higher dispositions scores. This discrepancy was further reflected in specific dispositions, like "Attentiveness", "Open-Mindedness", and "Intrinsic Goal Motivation", delineating unique trajectories in different courses. In sum, the application of the GLM-Univariate ANCOVA test shed light on the cohesive gains in critical thinking skills across the pilot courses. However, noteworthy differences emerged in the composite dispositions scores, showcasing higher scores in the business communication and virtual learning environments in economics courses. This distinction was further highlighted in specific dispositions, emphasizing the diversity of outcomes across these courses.

These findings pave the way for a deeper exploration of research questions two, three, and four. As we delve into an individual course analysis, a thorough examination of the data and its interpretation reveals substantial advancements in both skills and dispositions. Collectively, our responses to the research questions remain partially affirmative, as statistically significant improvements were witnessed in skills but not consistently in dispositions for all three courses, excluding a few significant differences in pedagogy and didactics of financial accounting, notably in "Open-Mindedness" and the total dispositions score.

This transformative outcome can be attributed to the immersive nature of labor market-oriented interventions. These interventions have capitalized on an array of interactive teaching methods, harnessed the potential of diverse learning resources, and actively engaged students in discovery-based processes. A striking exemplification of this approach can be observed in the pedagogy and didactics of financial accounting course. Here, students were immersed in multifaceted practical situations, including role transitions from participants to trainers. The integration of interactive tools, like Google Drive, facilitated

metacognition, interpretation, and explanation. The instructor's guidance in discerning pedagogical actions bolstered awareness and open-mindedness, ultimately culminating in enriched interpretation and explanation skills.

The critical thinking journey across these experimental courses mirrored a gradual yet impactful transformation. As the integration of labor market perspectives, interactive techniques, and engaging learning platforms converged, students' interpretive prowess and explanatory skills flourished. This journey illuminated the potential of innovative pedagogical paradigms in fostering critical thinking competencies, underscoring the symbiotic relationship between education and real-world application.

2. Definitions of Critical Thinking

Along with the passage of time and the development of technology, critical thinking (CT) has become one of the most sought-after skills in the job market. In fact, CT has been declared as one of the skills of the 21st century, as every person needs to possess this skill in order to be able to provide the necessary responses to the increasingly frequent and difficult-to-understand changes in today's modern world [1].

Over the last few decades, critical thinking has been defined in a multitude of ways: thinking about oneself in a reflective and active way [1–3], a self-regulated judgement with regard to a specific purpose related to the person him or herself [1,4,5], a type of thinking oriented towards understanding and solving problems, evaluating each decision-making alternative individually in order to adopt the best decisions [1,6,7], a judgement based on subjective and objective data analyzed in advance [1,8,9], and a way to learn to formulate questions, as well as draw accurate conclusions from a range of data and information [1,10]. The ideal critical thinker is a person who is informed, curious, objective, honest in making decisions without being influenced by personal prejudices, persevering in searching and researching all the information on a subject under analysis, and prudent in selecting criteria and formulating final conclusions [4].

The present study based its concept of critical thinking on Facione's definition from the Delphi project (1990). Critical thinking is viewed as a two-fold concept, combining skills and dispositions. If for skills, the definition is more congruent, the dispositions part is more problematic, and there are differences between Facione's definition and that of other authors. For example, Paul and Elder's [11] outlined intellectual traits (intellectual humility, intellectual courage, intellectual empathy, intellectual autonomy, intellectual integrity, intellectual perseverance, confidence in reason, and fair-mindedness) seem to be similar to Facione's disposition. In his vision, the dispositions are open-mindedness, inquisitiveness, analyticity, systematicity, cognitive maturity, truth-seeking, and self-confidence [4]. The instrument selected in the empirical research part is consistent with Facione's definition of critical thinking. Critical thinking skills are: analysis, interpretation, explanation, evaluation, inference, and self-regulation [4]. A student who possesses this skill will not only be able to understand the new information presented in the courses much more rapidly but will also integrate much more easily into the labor market, as he or she will be able to effectively deal with various difficult tasks.

3. Critical Thinking in the Business of Economics: Teaching Together with Labor Market Organizations

In the context of a constantly changing labor market, a new attitude is emerging, such that the success of an organization is ensured by its human resources, so the voice of employers calling for the importance of CT skills among employers is being increasingly heard [12]. According to Elicor [13], CT can be an essential tool for the management of organizations, contributing in a fundamental way to the identification of the best practical solutions, given the conditions of the business environment that require a high and constant level of effectiveness and competitiveness. Today's employees need to be able to generate new ideas and ways of working, while also embracing old techniques and systems of working to ensure competitive advantage [12,14].

The ability to think critically enables employees to think creatively, independently, adopt decisions, and take the necessary measures to counteract the negative effects of dysfunctions that occur [12,15–19], as well as to analyze the most complex problems in order to achieve the desired results [20]. In fact, in 2006, a consortium of American universities surveyed ranked CT higher than “innovation” and “application of information technology” as skills [21]. Thus, although it is well known that critical thinking should occupy an important place in education systems [22,23], since the earliest times, from the time of John Dewey, when reflective thinking was promoted [24], today, more and more labor market organizations are highlighting this skill. These new educational approaches have been designed to facilitate interdisciplinary thinking and lead to the cultivation of the capacity to act, self-determination, and the ability to reflect.

Indrasiene and colleagues [12] considered that in the context of the labor market, the ability to think critically helps employees to understand new concepts, to adopt decisions in critical situations, to engage positively and productively in activities, and in making the connection between theoretical topics and practical situations.

In this process, teachers have a very important role to assume, as it has been demonstrated that the development of students’ ability to think critically is not a direct result of higher education [25–27]; they need explicit and specialized instructions to improve their critical thinking skills [27–29]. Regarding the academic level, it is already known that the development of critical thinking skills should be integrated as part of formal education. At the educational level, the ability to think critically is not only considered from a competitive point of view [30], but also because it ensures the mature development of a person’s way of thinking so that he or she becomes independent, proactive, creative, and capable of adapting to a wide range of social, economic, and political circumstances [12,31–33]. Consequently, critical thinking skills are an outcome of the knowledge accumulated in higher education, reflected in the missions and government policies of universities, textbooks, assessment forms, and grading criteria [34].

Often, teachers’ lack of knowledge, as well as lack of experience in CT, is one of the main reasons why the concept of critical thinking is often not included in different parts of teaching [35,36]. In the area of education, there is still much debate about whether this concept should be included in other courses that are designed to develop certain professional skills among students, or whether a course should be made exclusively dedicated to developing critical thinking skills among students [37]. Regardless of how the concept of critical thinking is approached, it is a skill that should be mastered by every student, so every teacher should be encouraged to see CT as part of the learning outcomes of every subject, with the use of this skill representing a ‘thinking tool’ for students for the future period when they will face different business problems [21]. In teaching disciplines from the economics field, as well as other fields, however, it is difficult to develop guidelines on how critical thinking should be stimulated throughout the curriculum based on current research findings [28,38]. Nevertheless, most economists consider critical thinking skills to be an objective that should be pursued in economics courses [28] in response to employers’ demands that universities and colleges train graduates who are able to make connections in order to solve complex problems [39]. Also, the OECD also considers CT to be an economic, political, and psychological issue, being a higher-order skill whose main purpose is to evaluate a theory, statement, or idea through a whole process of questioning and analysis [40].

4. Materials and Methods

4.1. Variables

The dependent variable was critical thinking (CT). The definition used for the following research is in line with Peter Facione [4]. In order to operationalize the CT skills and dispositions, we used two tests: a dispositions questionnaire titled “SENCTDS-The Student-Educator Negotiated Critical Thinking Dispositions Scale”, which was developed by Quinn and colleagues [41], and another skills questionnaire designed by Nair [42] titled

“Critical Thinking Self-Assessment Scale–CTSAS”. Both tests were joined into one single test; thus, the final questionnaire consisted of 81 items (21 SENCTDS questions and 60 CT-SAS questions). This form of the two combined tests was validated by Payan-Carreira and colleagues [43]. The two tests were based on Facione’s classification for measuring critical thinking skills (Figure 1).

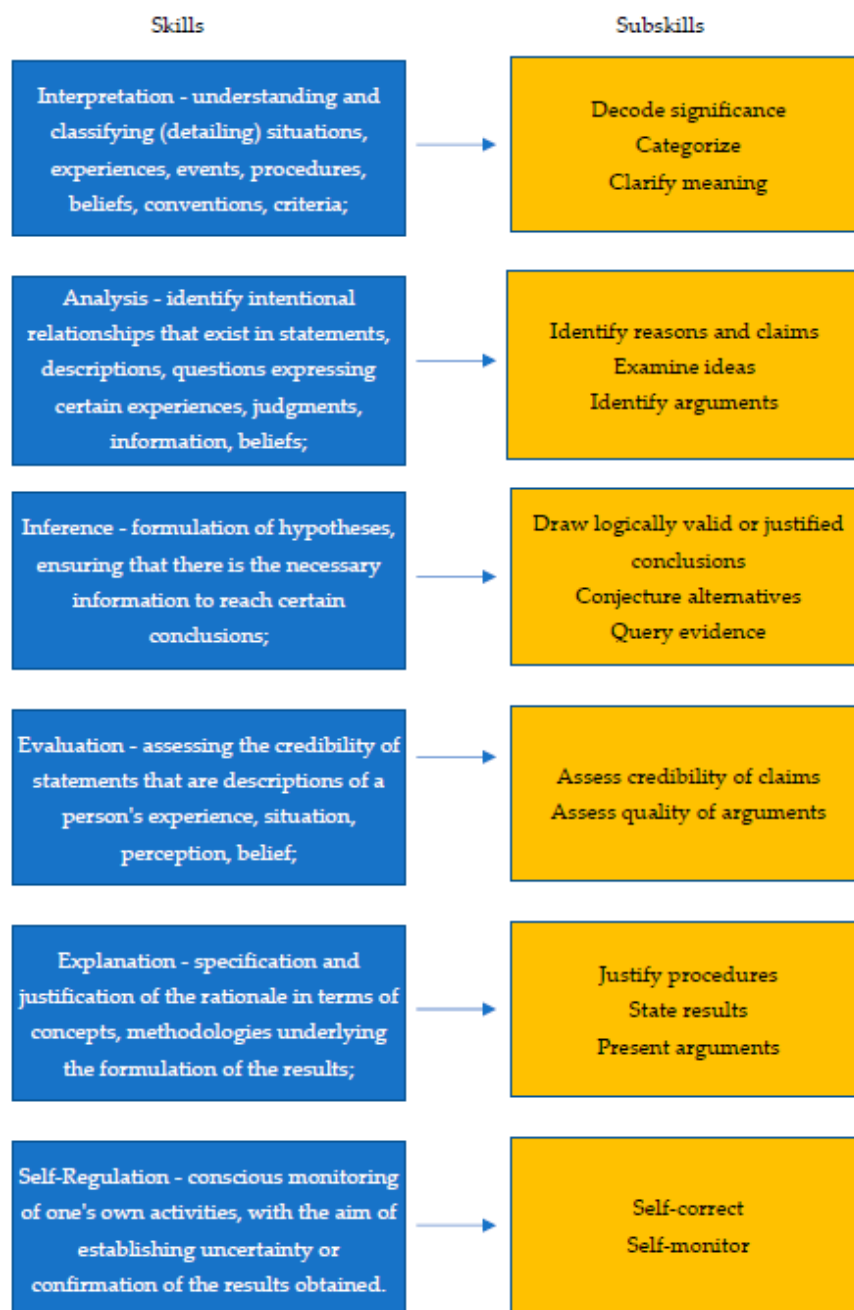


Figure 1. CT skills and subskills used in the test titled “Critical Thinking Self-Assessment Scale–CTSAS” (Nair).

Certain elements combine the specific classical dispositions of the Facione CT (inquisitiveness, systematicity, analyticity, truth-seeking, open-mindedness, self-confidence, and maturity) [44], forming new dimensions that have been anticipated to play a significant role in achieving success in academia and the labor market [45]. Thus, the resulting components encompass the six distinct dimensions of these: reflection, open-mindedness, attentiveness, organization, intrinsic goal motivation, and perseverance.

The independent variable is represented by three curricula resulted from business–university collaboration. University teachers (one lecturer and two professors) designed three courses in collaboration with two trainers specialized in banking and financial consultations.

Throughout the first course, pedagogy and didactics of financial accounting students will gain a better understanding of concepts related to economics and accounting, as well as information regarding the educational system and school curriculum [46]. The main competences that students have developed throughout the course are represented in the figure below (Figure 2) [46].

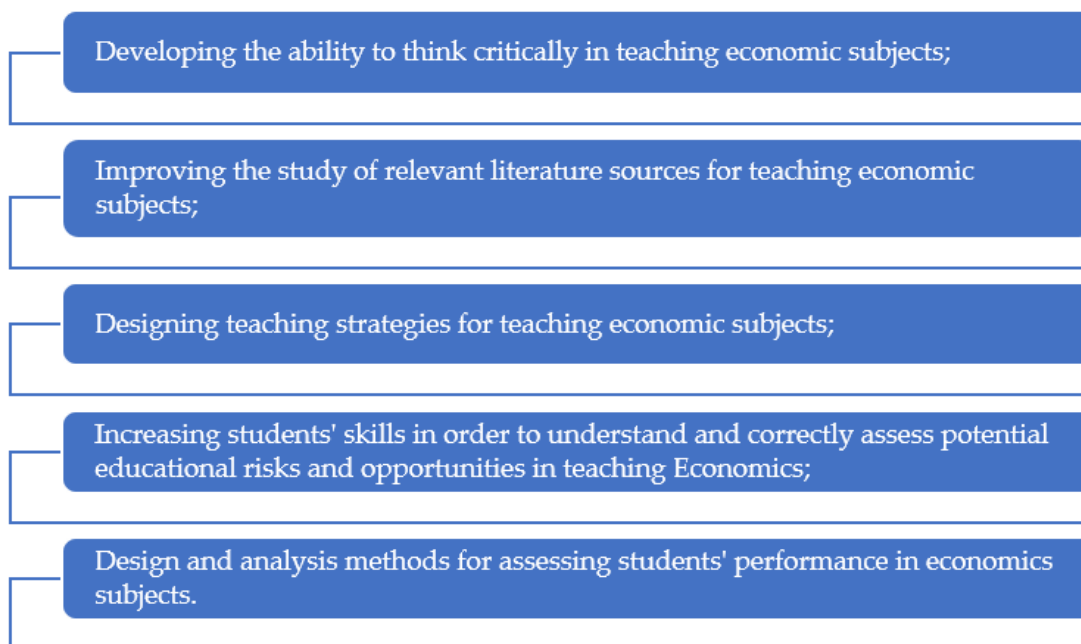


Figure 2. Skills developed by students from the pedagogy and didactics of financial accounting course.

Within this course, instructors devised diverse practical scenarios to engage students. One notable learning scenario entailed students participating in a training session where they were learners, followed by a subsequent meeting in which they assumed the role of the instructor. To support this process, students utilized an interactive tool on Google Drive that facilitated metacognition, interpretation, and explanation. This approach initiated with students delving into their recollection of content, subsequently reconstructing how the instructor conducted the session. This reflective phase aimed to transform the experience into a valuable educational encounter. Once this metacognitive stage was concluded, the higher education (HE) teacher introduced various teaching methods and strategies. This step aimed to elucidate the underlying pedagogical intentions of the instructor's actions, fostering awareness and cultivating open-mindedness. To further develop open-mindedness, dedicated classes conducted by the HE teacher were instrumental. During these sessions, students were tasked with devising multiple didactic scenarios targeting the same operational objectives. These scenarios encompassed varied methods, strategies, learning environments, and instructional materials. The HE teacher employed systematic observation ranking sheets to gauge the progression of open-mindedness [47].

Throughout this process, both the HE teacher and the trainer specializing in learning management systems (LMO) offered consistent and valuable guidance to students. This collaborative input enabled students to master the art of discerning pertinent information for crafting lesson plans specifically tailored to economics subjects. These lesson plans effectively aligned with the school curriculum, leading to substantial improvements in interpretation and explanation skills.

The second course, virtual learning environments in economics, was aimed at future economics teachers and focuses on the following areas: writing scientific materials, selecting the most effective teaching strategies through data processing, and creating interactive platforms in the virtual environment according to the students' needs [46]. At the end of this course, students' future economics teachers were able to effectively use digital content and communication channels characteristic of the virtual environment, such as Canva, Google sites, and Microsoft package. Students' assignment encompassed the creation of virtual learning environments, a process that demanded careful consideration of the subject matter and theoretical underpinnings. Drawing from best practice examples and insightful case studies, students embarked on the journey of crafting interactive platforms tailored to optimize educational activities within a virtual setting [46]. This immersive experience unfolded through a meticulous sequence. Beginning with a meticulous design phase for the chosen IT solution, students meticulously defined objectives and methods for content transmission. They proceeded to formulate and articulate the content, with each step scrutinized and guided by their instructor. From the initial stages to the final implementation of interactive solutions, the teacher remained a constant presence, offering guidance, evaluation, and refining techniques. Simultaneously, students engaged in a parallel endeavor—crafting diverse interactive presentations on various economics topics. Using the Canva platform, they synthesized the information imparted by their instructors. This approach aimed to bolster their analytical and research skills as they delved into the material, extracting essential data to address the assigned topics.

In a distinct learning avenue, the “Business Communication” course aimed to equip students with comprehensive knowledge about various communication types, including verbal, nonverbal, and paraverbal communication [48]. Having received the theoretical foundation, students transitioned into the realm of practical application, where they dissected the advantages, drawbacks, and nuances of these communication modes. This process encouraged critical thinking and the synthesis of theoretical insights with real-world scenarios. A significant portion of the course was devoted to exploring cross-cultural communication dynamics. Students embarked on research endeavors, discerning the significance of color symbolism across different countries and cultures. Their findings culminated in enlightening presentations, highlighting how colors can unwittingly serve as barriers or bridges in diverse global business contexts. Furthermore, students undertook the intricate task of analyzing authentic business situations, collaborating with labor market representatives. This involved immersing themselves in multifaceted project scenarios and assuming various roles, including project team members and managers. Through a comprehensive analysis of each stakeholder's perspective, students discerned problems, identified root causes, and proposed strategic improvements. The curriculum also embraced the critical notion of body language, office layout, and workspace design in shaping collaborative interactions within the business realm. Students received valuable insights from their instructors, enabling them to decipher the nuances of nonverbal cues, office dynamics, and spatial arrangements within an international context. Through thought-provoking exercises, they deepened their comprehension of how these elements influence effective communication and cooperation.

In essence, these courses provided a multi-dimensional learning experience, where theoretical foundations were translated into practical skill sets. Students navigated the complex landscape of virtual learning design, communication dynamics, and real-world problem-solving, emerging with enriched competencies poised for application in their academic and professional journeys.

All three courses had the goal of enhancing critical thinking (CT) skills and attitudes using an inquiry-based, constructivist teaching method. Each module included distinct learning assignments and evaluation tasks.

Based on the needs analysis [49], it was discovered that students preferred a bottom-up teaching approach, commencing with their own experiences and progressively linking concepts before delving into the theoretical aspects of the lesson. The LM (lifelong

learning model) instructor was inclined toward this strategy, with half of the lessons solely conducted by the LM instructor or in collaboration with the HE (higher education) teacher. These sessions employed certain techniques, like discovery-based learning, problem-solving, project-based learning, case studies, and role-playing to foster skill development, along with metacognitive strategies to cultivate awareness, open-mindedness, and intellectual humility.

Collaborating with the LM partners, the curriculum employed case studies, trigger scenarios (such as sets of images), and other learning scenarios. These compelled students to analyze specific situations, following the framework commonly used by the LM partners. Each student group received a case study or problem to scrutinize, generate questions, define concepts, make judgments, and engage in discussions regarding their thoughts and decisions. After contemplating and debating the presented topic, students were expected to propose a decision or solution, considering new contextual elements, motivations, and actual client needs. The LM partner occasionally participated by presenting a training section, akin to what they provide in service training, with students assuming trainee roles. This served to introduce various approaches for activity design or addressing communication challenges.

The university–business collaboration was comprehensive, and all classes were collaboratively designed to ensure a unified perspective on CT development. The total curriculum time was divided between the LM and the university teacher. While the trainer held the primary teaching role, the university teacher was consistently present in the classroom. Due to time constraints, the LM trainers were absent from the university teacher’s sessions. The classes were interconnected, with the LM trainers and university teachers conducting activities aligned with the scheduled theme. LM teaching primarily employed practical techniques, drawing from real-life examples in banking or training settings. Students were assigned specific tasks and encouraged to think as if they were employees, necessitating the application of various CT skills outlined in earlier sections. University teachers utilized top-down methods in their educational activities, employing concept-driven and concept-building tasks to bridge the experiential knowledge acquired from the LM trainer with current theoretical frameworks.

Considering the scope of these courses, and the fact that this study aimed to assess dispositions and skills specific to critical thinking, in order to analyze the degree of improvement in CT ability, students were tested before and after the finalization of the courses.

4.2. Method

The method that was chosen to check the degree of improvement in students’ ability to think critically was a quasi-experiment, with one experimental group replicated three times, with three different classes. We chose this method, as it was impossible to randomize the sample. These groups are the result of an admission process designed by the university, and there are ethical problems if we try to separate or randomize the experimental group. All students admitted to the program have the same rights to participate in educational activities. Therefore, it was impossible to have a control group (students that do not benefit for all educational activities delivered by the university to a particular program, including the experimental curriculum). Moreover, it is difficult to control for all the factors that may or may not have influenced critical skills and dispositions in the past. As there may be other sources that influence CT, but also our intervention, we assumed that testing students before and after the proposed classes developed together with our labor market partners, there are strong chances that the observed difference will be accounted for by our intervention. Hence, the best solution was to obtain our research through a quasi-experimental design to test the following research questions:

Q1: Is there an improvement of CT self-assessment results after the implementation of CT blended apprenticeships for all students from all three classes considered together?

As we may justly think that the three groups are starting from different levels of critical thinking, we proposed the following research questions, searching for each group's achievement.

We also checked the pre-test data to confirm the difference between groups.

Q2: Is there an improvement of CT self-assessment results after the implementation of CT blended apprenticeships in the pedagogy and didactics of financial accounting class?

Q3: Is there an improvement of CT self-assessment results after the implementation of CT blended apprenticeships in the virtual learning environments for economics class?

Q4: Is there an improvement of CT self-assessment results after the implementation of CT blended apprenticeships in the business communication class?

Regarding the mode of distribution of the data, using the Shapiro–Wilk test, a normal distribution was obtained. To interpret the data obtained before and after the three courses, the paired sample *t*-test was applied, using Jamovi software. The results obtained in the pre-test stage were noted with T1, while those derived from the final test were marked with T2. The six main categories of skills studied were: analysis, interpretation, explanation, evaluation, inference, and self-regulation. The dispositions categories included: intrinsic goal motivation, attentiveness, open-mindedness, organization, reflection, and perseverance. For skills, the following subcategories resulting from the applied questionnaire were also studied: analysis (examining ideas, detecting arguments, and analyzing arguments), interpretation (categorization, decoding significance, and clarifying meaning), explanation (stating results, justifying procedures, and presenting arguments), evaluation (assessing claims and assessing arguments), inference (querying evidence, conjecturing alternatives, and drawing conclusions), and self-regulation (self-examining and self-correction).

Given the relatively short period over which the courses were run (one semester), we also conducted a qualitative study to better understand the trainees' perspectives and experiences. To this end, students were asked to complete a reflective diary consisting of 13 open-ended questions. The first 6 questions were about student identification data, and the next 7 questions were about the impact of the courses on the participants and the positive changes brought about by the introduction of critical thinking in the three curricula.

To obtain a more concrete and grass-roots view of the educational process, we also conducted a qualitative research by asking students to fill out a reflective journal (diary) at any time during the course. The results confirmed the high level of awareness regarding CT skills (but not CT dispositions) and provided rich and useful testimonies from the participants.

4.3. Participants

The final sample consisted of 81 students (68 female and 13 male) who participated in the study: 32 students from the pedagogy and didactics of financial accounting class—bachelor level, second year; 18 students from the virtual learning environments class—master level, second year; and 31 students from the business communication class—master level, second year. The initial sample consisted of 143 students, but only 81 completed both the pre- and post-tests. We planned three test sessions, namely pre-test, mid-test, and post-test, but we had to exclude the mid-test, as the same students did not complete the pre-test and the post-test. A reward was set for students who participated; 30% of the final grade was considered fully completed if a student attended at least 60% of the classes and took the critical thinking tests. Participants in the three courses ranged in age from 21 to 50.

4.4. Procedure

The first course, pedagogy and didactics of financial accounting, had a duration of 14 weeks (2 h/week), and was held from October 2021 to January 2022. The number of interventions held by representatives of labor market organizations was 8 interventions (16 h in total).

The second course, virtual learning environments in economics, was conducted from February to May 2022, with a total duration of 14 weeks (2 h/week). The number of interventions held by labor market trainers was 5 interventions (10 h in total).

The last experimental course, business communication, was implemented in the second semester of the school year 2021–2022 (from February to May of 2022) for a total duration of 13 weeks (2 h/week). Labor market representatives conducted 7 interventions (14 h in total). Critical thinking self-assessment tests were administered in the first, the seventh, and the last week of the class, in all three classes.

Regarding the qualitative study, the questionnaire for reflective journal was distributed to all students who participated in both the pre-test and the post-test, obtaining a total number of 67 responses: 19 responses from students of the pedagogy and didactics of financial accounting class, 18 responses from students of the virtual learning environments class, and 30 responses from students of the business communication class.

5. Results and Discussion

5.1. Quantitative Analysis: Results and Discussion

Strictly analyzing the results obtained at the level of the three courses in the pre-test and in the post-test, after scoring the negative statements/items in reverse and after performing the necessary calculations, we presented the main changes resulted at the level of skills, sub-skills, and dispositions.

To assess the normality of the distribution, we have used the Shapiro–Wilk test. The pedagogy and didactics of financial accounting class had the following values for critical thinking skills: total scores: $w = 0.977$ and $p = 0.722$, and their CT dispositions total scores for normality were $w = 0.945$ and $p = 0.104$. The virtual learning environments for economics class had the following values for critical thinking skills: total scores: $w = 0.897$ and $p = 0.092$, and their CT dispositions total scores for normality were $w = 0.940$ and $p = 0.291$. The Business Communication class had the following values for critical thinking skills: total scores: $w = 0.960$ and $p = 0.288$, and their CT dispositions total scores for normality were $w = 0.947$ and $p = 0.131$. Since all p -values were greater than 0.05, we cannot reject the null hypothesis, and therefore we can assume normality of the distribution.

The biggest improvement was in the skills domain, and not at all in the dispositions. This means that we are able to partially respond positively to the first research question (Q1: Is there an improvement of CT self-assessment results after the implementation of CT-blended apprenticeships for all students from all three classes considered together?). As can be seen from the Table 1 above, the main significant changes were in the skills, both in the main categories (interpretation and explanation), subcategories (clarifying meaning, assessing claim, stating results, justifying procedures, and presenting arguments), and total CrT score. This is mainly due to the fact that in each course the students had the opportunity to deal with different real-life cases in addition to theoretical information, especially due to the participation of representatives from the labor market. Thus, they improved their interpretation skills ($t = 3.763$, $p = 0.000$) and assessing claims, a subcategory of the evaluation skill ($t = 2.036$, $p = 0.045$), as during the courses the students had to interpret a range of data and information according to the topics covered, researching and evaluating each decision option. The students also had to present their final decision on a particular situation/case study and briefly justify the final results and the arguments that led to their choice (improvements in explanation skills, $t = 4.217$, $p = 0.000$).

Table 1. Skills/dispositions developed by students during the three experimental courses combined (T1—pre-test; T2—post-test).

Skills/Dispositions			Mean T2_T1	Paired Differences					t	df	Sig. (2-Tailed)
				Mean	Std. Devia- tion	Std. Error Mean	95% Confidence Interval of the Difference				
							Lower	Upper			
Pair 2	Interpretation	Clarifying mean- ing_T2	18.33	1.827	3.768	0.419	0.994	2.660	4.365	80	0.000
		Clarifying mean- ing_T1	16.51								
Pair 7	Evaluation	Assessing claim_T2	9.32	0.457	2.019	0.224	0.010	0.903	2.036	80	0.045
		Assessing claim_T1	8.86								
Pair 12	Explanation	Stating re- sults_T2	9.04	0.802	2.182	0.242	0.320	1.285	3.310	80	0.001
		Stating re- sults_T1	8.23								
Pair 13	Explanation	Justifying proce- dures_T2	9.22	0.765	2.341	0.260	0.248	1.283	2.942	80	0.004
		Justifying proce- dures_T1	8.46								
Pair 14	Explanation	Presenting argu- ments_T2	25.83	2.716	6.431	0.715	1.294	4.138	3.801	80	0.000
		Presenting argu- ments_T1	23.11								
Pair 17	Interpretation_T2	42.07	2.654	6.349	0.705	1.251	4.058	3.763	80	0.000	
	Interpretation_T1	39.42									
Pair 21	Explanation_T2	44.09	4.284	9.142	1.016	2.262	6.305	4.217	80	0.000	
	Explanation_T1	39.80									
Pair 23	CT Skills total score_T2	275.36	12.519	39.353	4.373	3.817	21.220	2.863	80	0.005	
	CT Skills total score_T1	262.84									

Being a complex psychological phenomenon, critical thinking is hard to explain how it is improved by one or another method or teaching approach. The classes followed an inquiry-based, constructivist approach, with an increased number of teaching methods and case studies, things specific to labor market pedagogical approaches. We were targeting all skills and dispositions, but it appears that only some of them improved. However, we can say that a class designed together with the labor market, which explicitly teaches critical thinking, will have a statistically significant result on critical thinking skills, combined, as shown by the result of the total CrT score ($t = 2.863$, $p = 0.005$).

Regarding dispositions, no significant results were obtained. We assumed that there was insufficient time to have a significant impact on something that is like a personality trait. The Aristotle's critical spirit (and we believe that this is the case for the dispositions) necessitates a significant effort over an extended period of time to be cultivated.

The results of the global analysis for all components are presented in Appendix A.

We tested the assumption that these groups are not equal in terms of their CT skills and dispositions, an assumption that led to the formulation of research questions two, three, and four.

The analysis of the three pilot courses revealed notable variances in the initial scores of students across the distinct courses in terms of the “Interpretation” skill and the “Perseverance” disposition. In either scenario, the Bonferroni post-hoc test affirmed the existence of differences between the pedagogy and didactics of financial accounting course and the virtual learning environments in economics course [45]. Moreover, in both instances, students engaged in the virtual learning course exhibited higher average scores in “Interpretation” (14.35 vs. 12.67, respectively) and “Perseverance” (6.00 vs. 5.20, respectively) compared to students enrolled in the pedagogy and didactics of financial accounting course.

The GLM-Univariate ANCOVA test was utilized to evaluate the progress in three pilot courses: business communication ($n = 31$), pedagogy and didactics of financial accounting ($n = 32$), and virtual learning environments in economics ($n = 18$). However, caution is warranted in interpreting the observed differences, as the assumption of no prior differences among the groups in the covariate was not met for the “Interpretation” skill and the “Perseverance” disposition, as discussed earlier [45].

In general, there were no notable differences in the gains related to critical thinking (CT) skills resulting from the interventions across the three pilot courses. Yet, when examining the integrated score of CT dispositions, there was a significance ($p = 0.017$) favoring higher scores for students in the business communication and virtual learning environments in economics (32.45 ± 4.613 and 32.25 ± 3.78 , respectively) compared to those in the pedagogy and didactics of financial accounting course (29.38 ± 4.34).

Regarding the improvements in dispositions, variations between the courses were evident in several aspects:

- Attentiveness: Differences were observed ($p = 0.028$), with business communication students showing greater gains compared to virtual learning environments in economics or pedagogy and didactics of financial accounting students (4.45 ± 1.31 vs. 3.73 ± 1.21 vs. 3.89 ± 1.38 , respectively).
- Open-mindedness: Differences were noted ($p = 0.047$), with business communication and pedagogy and didactics of financial accounting students displaying higher gains than virtual learning environments in economics students (5.14 ± 1.40 and 5.22 ± 1.30 vs. 4.47 ± 1.33 , respectively).
- Intrinsic goal motivation: A significant difference was observed ($p = 0.009$), where business communication and pedagogy and didactics of financial accounting students exhibited greater gains (5.92 ± 1.02 and 5.75 ± 0.76 , respectively) compared to virtual learning environments in economics students (5.11 ± 0.91).

In summary, the application of the GLM-Univariate ANCOVA test revealed no substantial discrepancies in the gains of critical thinking skills among the three pilot courses. However, differences emerged in the integrated scores of CT dispositions, highlighting higher scores in the business communication and virtual learning environments in economics courses. Noteworthy variations were also observed in specific dispositions, including “Attentiveness”, “Open-Mindedness”, and “Intrinsic Goal Motivation”, across the different courses.

We then proceeded to search the data for the research questions two, three, and four.

With regard to the analysis of each individual course, the main significant scores, following statistical analysis and interpretation of the data obtained, were observed in both categories: skills and dispositions (Table 2). All the results obtained after applying the paired sample *t*-test at the level of each course are presented in Appendix B. Hence, we can also only respond partially positively to all research questions, since there were statistically significant changes in the skills but not in the dispositions, to all three courses, with the exception of the pedagogy and didactics of financial accounting course, which exhibited a significant difference before and after the intervention on open-mindedness ($t = 28.525$, $p = 0.008$) and on the total dispositions score ($t = 22.090$, $p = 0.035$).

Table 2. Skills and dispositions developed by students in **each** experimental course (calculated using the paired sample *t*-test).

Skills/Dispositions	Mean T2_T1	Paired Sample <i>t</i> -Test		
		t	df	<i>p</i>
Pedagogy and didactics of financial accounting				
Clarifying meaning_T2	17.60	−32.059	31.0	0.003
Clarifying meaning_T1	15.70			
Stating results_T2	8.84	−48.237	31.0	<0.001
Stating results_T1	7.38			
Presenting arguments_T2	25.60	−26.692	31.0	0.012
Presenting arguments_T1	22.50			
Interpretation_T2	40.40	−31.977	31.0	0.003
Interpretation_T1	37.40			
Explanation_T2	43.10	−35.008	31.0	0.001
Explanation_T1	37.70			
Open-mindedness_T2	17.90	28.525	31.0	0.008
Open-mindedness_T1	20.60			
CrT Skills total score_T2	264.00	−23.154	31.0	0.027
CrT Skills total score_T1	250.00			
CrT Dispositions total score_T2	101.00	22.090	31.0	0.035
CrT Dispositions total score_T1	107.00			
Virtual learning environments in economics				
Analyzing arguments_T2	18.70	−60.592	17.0	<0.001
Analyzing arguments_T1	17.30			
Business communication				
Clarifying meaning_T2	18.50	−26.859	30.0	0.012
Clarifying meaning_T1	16.30			
Justifying procedures_T2	9.68	−25.403	30.0	0.016
Justifying procedures_T1	8.71			
Presenting arguments_T2	26.20	−25.086	30.0	0.018
Presenting arguments_T1	23.10			
Interpretation_T2	42.50	−23.039	30.0	0.028
Interpretation_T1	39.50			
Explanation_T2	44.60	−23.360	30.0	0.026
Explanation_T1	40.50			

Regarding the previously formulated research questions, as the results show, the intervention of the instructors in the labor market and changing teaching approach contributed to the development and improvement of critical thinking skills among the students; improved results were registered at the level of the interpretation and explanation skills, with their related subcategories, as well as at the level of the subcategory analyzing arguments, characteristic of the evaluation skill. Significant changes were also obtained for the open-mindedness disposition.

This is mainly because labor market organizations use a range of textbooks, practical exercises, case studies, platforms, and websites that can be accessed by learners compared to

higher education institutions. Thus, participants have the opportunity to learn everything through e-learning games/sessions/tutorials [47]. Also, during the interventions, trainers from the labor market organizations used different interactive images and short videos adapted, of course, to the topics addressed in each course. As a result, the students' interpretation and explanation skills significantly improved.

At the level of the pedagogy and didactics of financial accounting course, students were put by the trainers into different practical situations. One learning scenario addressed by the trainers consisted of presenting a training session in which the students were participants, and in the next meeting they acted from the teacher's perspective. Students had an interactive instrument in Google Drive which facilitated metacognition, interpretation, and explanation. Students were asked to start from content they remember and then to recall how the trainer acted in that moment, how the strategy looked. How was that moment a valid educational experience? After the metacognitive stage, the HE teacher named teaching methods and strategies in order to clarify the meaning of the trainer's pedagogical actions. This step was necessary for obtaining awareness and enhancing open-mindedness. The latter was also developed in the classes held exclusively by the HE teacher. Students had to create multiple didactical scenarios for the same set of operational objectives, using different methods, strategies, environments, and materials. Open-mindedness was monitored by the teacher using systematic observation ranking sheets [48]. The HE teacher and LMO trainer continuously provided valuable inputs to the students, who were able to learn how to select the information needed to teach a lesson specific to economics subjects, taking into account the school curriculum, and thus significant results were achieved in improving the interpretation and explanation skills. A great deal was invested in open-mindedness, with metacognition as the driving tool. The higher education teacher monitored, through observational sheets, the progress of the students.

Overall skill scores increased. We can assume that an inquiry-based, constructivist approach, with an increased number of teaching methods and case studies, things specific to the labor market pedagogical approaches, improve critical thinking skills. But we cannot know, explain, or account that a new intervention will improve the same skills. However, we can say that a class designed together with the labor market, which explicitly teaches critical thinking, will have a statistically significant result on critical thinking skills, combined, as shown by the result of the total CrT score ($t = 2.863$, $p = 0.005$).

In comparison to dispositions, skills develop faster, meaning it is feasible to propose a semester class and to tackle skills, but is increasingly problematic to aim for the dispositions in such a short amount of time.

For the second course, virtual learning environments in economics, the students were assigned to develop a virtual learning environment using various IT solutions, such as Google sites and other solutions, for a discipline chosen by them. Considering the theoretical information transmitted, through the use of best practice examples and case studies, students have developed various interactive platforms that will ensure the best conditions for educational activities in the virtual environment [46]. The entire process of creating interactive learning solutions in the virtual environment created by the students was permanently monitored and moderated by the teacher. From the stage of designing the IT solution, establishing the objectives and the methods by which the content will be transmitted, designing and writing the content, and up to the implementation of the interactive solutions created by the students, the teacher analyzed their evolution, discussed with the students, and showed them the best ways to maximize the effectiveness of the interactive learning solutions in the virtual environment created. At the same time, they had to create different interactive presentations on various economics topics using the Canva platform, according to the information presented by the trainers in the courses. In this way, after analyzing and researching the information, in order to determine the most important data for solving the assigned topics, the students especially developed their analyzing arguments skills ($p < 0.001$).

Through the business communication course, students have acquired a series of theoretical information on the main types of communication (verbal, nonverbal, and paraverbal) [49]. After the delivery of the information by the teachers, the students interpreted the information and presented their arguments on the main advantages, disadvantages, and differences/similarities of the types of communication. Another topic discussed with the students in regard to the types of communication was about the mission and vision of the organizations. After the presentation of the information, the students had to analyze and interpret different missions and visions of well-known companies, trying to identify what information is intended to be communicated by the organization to its end-users, as well as the moods/emotions/feelings that these missions and visions create on an unconscious level in people.

They also had to analyze different business situations. A case study addressed by the labor market representatives together with the students aimed at identifying the main dysfunctions occurring in the implementation of the projects, so the students had to transpose themselves one by one, both in the role of the project team members and in the role of the project manager trying to find the best solution to improve the problematic situations. The students had to analyze each party involved in the project in order to identify the problems that had occurred and clarify the issues, and then interpret all the data obtained in order to design a successful project. In transforming a failed project into a successful one, students had to justify the main methods and procedures used and specify which activities/sub-activities would be changed/updated.

At the same time, this course addressed issues related to the main barriers encountered in the communication process in the business environment. Students had to work in teams to find the meaning of certain colors in different countries and to explain in a presentation how colors are considered by different cultures (e.g., the color yellow represents the color of mourning in Egypt, while in Japan it represents courage, etc.). After all the presentations, the students worked on a common presentation concluding which colors could represent a barrier in a business meeting. Also related to the business meetings, students were presented information by teachers regarding the body language, worktables, and office layout in order to promote a cooperative relationship, analyzing and interpreting several situations from official international meetings.

As it is also evident from the presentation of the main themes addressed with the students throughout the business communication course, the students, as a result of analyzing and interpreting certain data/situations/case studies, as well as due to all the activities they took part in, improved their critical thinking skills, in particular, their skills of explanation ($p = 0.001$) and interpretation ($p = 0.003$), as well as the subcategories of clarifying meaning ($p = 0.012$), justifying procedures ($p = 0.016$), and presenting arguments ($p = 0.018$).

Throughout the three experimental courses, the labor market trainers used different interactive teaching methods, and it was also their responsibility to arouse the students' curiosity and get them actively involved during the sessions, directing them towards discovering the results.

5.2. Qualitative Analysis: Results and Discussion

Given the limited changes observed in skills and dispositions, in order to investigate the changes brought about via the critical thinking approach in the three courses in depth, we analyzed the responses obtained from the qualitative study conducted. The first questions analyzed relate to each participant's perception of critical thinking, or the steps they follow when students are confronted with a problem. Students in the course "Pedagogy and Didactics of Financial Accounting" thought that critical thinking meant "analysing situations" (eleven responses), "making decisions" (six responses), "thinking/choosing objectively" (nine responses), "considering multiple options/perspectives" (four responses), "searching for/finding good solutions/arriving at sound conclusions" (four responses), and "ignoring distractions" (one response). Similar to students in the first course, students in the second course (virtual learning environments in economics) tended

to associate critical thinking with the analysis part, with the following responses: “thinking/choosing objectively” (one response), “considering multiple options/perspectives” (one response), “searching/finding good solutions/reaching sound conclusions” (three responses), “ignoring/identifying distractions/bias” (two responses), “analysing and/or making decisions/searching for solutions” (eight responses), “seeking information from credible sources/scientific research” (one response), “constructive criticism, clarifying questions” (one response), and “reflective attitude” (one response). Students from the last course, business communication, as well as the others, also tended to associate critical thinking with the analysis of information in order to make the best decision, with the main responses being “thinking/choosing objectively” (five responses), “considering different options/perspectives” (two responses), “searching for/finding good solutions/making sound conclusions/based on information” (three responses), “analysing and making decisions/searching for solutions” (eight responses), “seeking information from credible sources/scientific research” (three responses), “solving problems” (four responses), “analysing information, highlighting reasons/causes, finding solutions” (one response), “logical approach, not influenced by feelings” (two responses), “identifying sub-problems within the problem to be solved” (one response), and “not accepting information as unquestionable” (one response).

As the quantitative research showed, the majority of participants developed their skills (analysing, explaining, evaluating, interpreting, and concluding) more effectively than their dispositions. For example, when asked about the steps taken to solve a problem, most students (both masters and bachelor respondents) referred to the following skills: “analysing the problem, identifying possible solutions, choosing an effective solution” (twenty-seven responses), “understanding the problem, searching for information, solving the problem” (eight responses), “analysing/understanding the problem, making conclusions/decisions” (seven responses), “identifying the problem, the resources available and the tools needed to solve it” (six responses), “identifying the causes of the problem, analysing solutions” (six responses), analysing solutions” (six responses), “identifying as many possible solutions as possible” (five responses), “analysing the problem, consulting with others, making a decision” (three responses), “finding information, analysing the consequences, making a decision” (three responses), “hypothesising, choosing a solution” (two responses), and “analysing the problem, identifying the resources available to solve it, identifying the solution, implementing it” (two responses).

When asked about the impact of the inclusion of critical thinking aspects in the three courses, all the students (both masters and bachelor) considered that the method of approaching the courses helped them to better understand the link between theory and practice, and that the information acquired allowed them to solve future problems in a different and more efficient way, stating the following: “by constantly drawing parallels with the real world, I was able to better understand the applicability of the theory”, “the applications of the course made me better understand how a good teacher should behave”, “I learned a lot about the educational process, which will help me in my professional and personal work”, “The course dealt with topical elements (through examples or even the subject matter was constructed in such a way that it was part of the information/problems we face every day”, “This course has widened my range of approaches I can consider to solve problems and situations”, and “I will be able to make much better decisions than before; The steps in problem solving are essential and now that I have a handle on them, I will turn any problem into a solution”.

The vast majority of responses converged on awareness of the development of critical thinking skills, which is consistent with the quantitative analysis of the results. The test used in the quantitative analysis was also self-reported, and awareness was an important factor in completing the test. Therefore, the feedback obtained through the reflective journal confirms the overall awareness that students had regarding critical thinking skills.

6. Limitations

The limitations of this research are related to the tools/methods used, as well as the lack of a control group. It was not possible to have one unless the students were from completely different subjects. None of experimental groups have twin groups. We chose to proceed with the experiment, as in educational environments, this situation is frequent. One teacher conducted classes to just one group, which required intervention. The exclusion of some students from the experimental groups raises ethical issue for the university. All students have equal rights to benefit from these courses. Hence, she/he must act just as the present research did, addressing to the group and making the best of it in due time. The short time for the course activities was another limitation, but it can also be one of the conclusions. One semester (the standard length of a class) is not sufficient to trigger improvements in the dispositions, but it is sufficient to develop critical thinking skills. A third limitation is the evaluation instrument. Being a self-reported/self-assessment, such an instrument requires awareness of the involved changes. The qualitative feedback confirmed the results of the previous assessment, with students only reporting about skills and not about dispositions. We are not sure if changes have been produced regarding dispositions, as it was clear that the participants were not sufficiently aware to report them. If future research will be proposed, an objective critical thinking test (skills and dispositions) should also be employed. An unforeseen limitation was uncovered in relation to the large number of students who attended the class and did not fill in the assessment questionnaires. Statistical analysis could only be performed involving those who filled in the pre- and post-test questionnaires. We were obliged to eliminate the intermediate test results and only keep the pre- and post-tests, since we had students who filled in the pre-and intermediate tests, or intermediate and post-tests.

7. Conclusions

In conclusion, the meticulous analysis of the outcomes stemming from the comprehensive study on critical thinking has provided a multifaceted perspective on the intricacies of skill and disposition development within educational contexts. The journey traversed through the three distinct courses, business communication, pedagogy and didactics of financial accounting, and virtual learning environments in economics, unveiled intriguing patterns of improvement and transformation.

A recurring theme that emerged from the data is the robust nature of skill enhancement, a facet that responded more readily to the interventions. The progressive shifts within the interpretation, explanation, and evaluation skills were undeniably influenced by the dynamic blend of labor market insights and innovative teaching methods. The engagement of students in real-world scenarios, the integration of diverse learning platforms, and the facilitation of metacognitive processes collectively underscored the potency of these pedagogical strategies in honing critical thinking skills. The interactive nature of these courses, guided by labor market expertise, not only imparted theoretical knowledge but also kindled curiosity, nurturing an environment where students actively constructed their own understanding and applied their learning to practical scenarios.

While these skills demonstrated notable advancements, the journey of disposition development posed distinct challenges. The intricacies of the dispositions, akin to personality traits, proved more resistant to change within the relatively short timeframe of the courses. Nevertheless, the observation of variations in certain dispositions, namely attentiveness, open-mindedness, and intrinsic goal motivation, across different courses shed light on the nuances of disposition enhancement. It is clear that these traits, reflective of Aristotle's critical spirit, demand a prolonged and sustained effort to cultivate. The journey to foster open-mindedness, in particular, highlights the importance of metacognition and the creation of multiple didactical scenarios, as seen in the pedagogy and didactics of financial accounting course.

These findings underscore the intrinsic value of labor market perspectives in shaping contemporary education. The infusion of real-world relevance not only kindles students'

enthusiasm but also augments their critical thinking competencies. The inquiry-based, constructivist approach employed across the courses presents a promising avenue for skill and disposition development. This approach, characterized by interactive learning, collaborative problem-solving, and experiential engagement, aligns closely with labor market pedagogical paradigms, fostering a seamless transition from academia into the professional sphere.

The quantitative analysis relied on self-reported data, emphasizing the importance of awareness in completing the given test. Overall, the feedback obtained from students' reflective journals affirmed the students' general awareness of critical thinking skill development.

The study's limitations warrant acknowledgment. The short duration of the courses limited the extent of disposition development, emphasizing the need for sustained interventions to instill lasting change in these personality traits. Additionally, the study's focus on specific courses and contexts necessitates cautious generalization to other educational settings.

In conclusion, this comprehensive exploration illuminates the multifaceted nature of critical thinking enhancement within diverse educational contexts. The amalgamation of labor market insights, innovative pedagogical techniques, and immersive learning experiences provides a holistic framework to nurture both skills and dispositions. The journey transcends the boundaries of traditional education, embracing the transformative potential of dynamic learning environments that mirror the complexities of the real world. As we navigate the ever-evolving landscape of education, the insights garnered from this study inspire us to continually refine our pedagogical approaches, catalyzing critical thinking prowess, and nurturing future-ready individuals.

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Appendix A

Skills/Dispositions that Students Acquired during the Three Experimental Courses Combined Skills/Dispositions		Paired Differences					<i>t</i>	df	Sig. (2-Tailed)
		Mean	Std. Devia- tion	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Categorization_T2-Categorization_T1	0.370	2.874	0.319	−0.265	1.006	1.160	80	0.250
Pair 2	Clarifying meaning_T2-Clarifying meaning_T1	1.827	3.768	0.419	0.994	2.660	4.365	80	0.000
Pair 3	Decoding significance_T2-Decoding significance_T1	0.457	2.247	0.250	−0.040	0.954	1.829	80	0.071
Pair 4	Detecting arguments_T2-Detecting arguments_T1	0.074	2.371	0.263	−0.450	0.598	0.281	80	0.779
Pair 5	Analysing arguments_T2-Analysing arguments_T1	0.901	4.406	0.490	−0.073	1.876	1.841	80	0.069
Pair 6	Examining ideas_T2-Examining ideas_T1	0.136	4.563	0.507	−0.873	1.145	0.268	80	0.789
Pair 7	Assessing claim_T2-Assessing claim_T1	0.457	2.019	0.224	0.010	0.903	2.036	80	0.045
Pair 8	Assessing arguments_T2-Assessing arguments_T1	0.333	4.536	0.504	−0.670	1.336	0.661	80	0.510
Pair 9	Drawing conclusions_T2-Drawing conclusions_T1	0.963	4.905	0.545	−0.122	2.048	1.767	80	0.081
Pair 10	Conjecturing alternatives_T2-Conjecturing alternatives_T1	0.494	4.683	0.520	−0.542	1.529	0.949	80	0.345
Pair 11	Querying evidence_T2-Querying evidence_T1	0.494	2.825	0.314	−0.131	1.118	1.574	80	0.120
Pair 12	Stating results_T2-Stating results_T1	0.802	2.182	0.242	0.320	1.285	3.310	80	0.001
Pair 13	Justifying procedures_T2-Justifying procedures_T1	0.765	2.341	0.260	0.248	1.283	2.942	80	0.004
Pair 14	Presenting arguments_T2-Presenting arguments_T1	2.716	6.431	0.715	1.294	4.138	3.801	80	0.000
Pair 15	Self-examining_T2-Self-examining_T1	1.210	5.809	0.645	−0.075	2.494	1.875	80	0.065
Pair 16	Self correction_T2-Self correction_T1	0.519	3.009	0.334	−0.147	1.184	1.551	80	0.125
Pair 17	Interpretation_T2-Interpretation_T1	2.654	6.349	0.705	1.251	4.058	3.763	80	0.000
Pair 18	Analysis_T2-Analysis_T1	1.111	9.068	1.008	−0.894	3.116	1.103	80	0.273
Pair 19	Evaluation_T2-Evaluation_T1	0.790	5.901	0.656	−0.515	2.095	1.205	80	0.232
Pair 20	Inference_T2-Inference_T1	1.951	10.386	1.154	−0.346	4.247	1.690	80	0.095
Pair 21	Explanation_T2-Explanation_T1	4.284	9.142	1.016	2.262	6.305	4.217	80	0.000

Cont.

Pair 22	Self-regulation_T2-Self-regulation_T1	1.728	8.023	0.891	−0.046	3.503	1.939	80	0.056
Pair 23	CT Skills total score_T2-CT Skills total score_T1	12.519	39.353	4.373	3.817	21.220	2.863	80	0.005
Pair 24	Reflection_T2-Reflection_T1	−0.309	2.677	0.297	−0.901	0.283	−1.038	80	0.303
Pair 25	Attentiveness_T2-Attentiveness_T1	−0.259	4.924	0.547	−1.348	0.829	−0.474	80	0.637
Pair 26	Open-mindedness_T2-Open-mindedness_T1	−1.160	5.304	0.589	−2.333	0.012	−1.969	80	0.052
Pair 27	Organization_T2-Organization_T1	0.605	3.869	0.430	−0.251	1.460	1.407	80	0.163
Pair 28	Perseverance_T2-Perseverance_T1	0.111	3.417	0.380	−0.644	0.867	0.293	80	0.771
Pair 29	Intrinsic goal motivation_T2-Intrinsic goal motivation_T1	−0.123	3.621	0.402	−0.924	0.677	−0.307	80	0.760
Pair 30	CT Dispositions total score_T2-CT Dispositions total score_T1	−1.136	13.698	1.522	−4.165	1.893	−0.746	80	0.458

Appendix B

Skills and Dispositions that Students Acquired in Each Experimental Course—Paired Sample <i>t</i> -Test Skills/Dispositions		Paired Sample <i>t</i> -Test		
		Statistic	df	<i>p</i> -Value
Pedagogy and didactics of financial accounting				
Categorization_T1	Categorization_T2	−19.823	31.0	0.056
Clarifying meaning_T1	Clarifying meaning_T2	−32.059	31.0	0.003
Decoding significance_T1	Decoding significance_T2	−0.5834	31.0	0.564
Detecting arguments_T1	Detecting arguments_T2	−11.365	31.0	0.264
Analysing arguments_T1	Analysing arguments_T2	−16.208	31.0	0.115
Examining ideas_T1	Examining ideas_T2	0.6432	31.0	0.525
Assessing claim_T1	Assessing claim_T2	−0.9834	31.0	0.333
Assessing arguments_T1	Assessing arguments_T2	−0.7760	31.0	0.444
Drawing conclusions_T1	Drawing conclusions_T2	−10.768	31.0	0.290
Conjecturing alternatives_T1	Conjecturing alternatives_T2	−14.878	31.0	0.147
Querying evidence_T1	Querying evidence_T2	−0.6522	31.0	0.519
Stating results_T1	Stating results_T2	−48.237	31.0	<0.001
Justifying procedures_T1	Justifying procedures_T2	−19.132	31.0	0.065
Presenting arguments_T1	Presenting arguments_T2	−26.692	31.0	0.012
Self-examining_T1	Self-examining_T2	−0.9802	31.0	0.335
Self correction_T1	Self correction_T2	−0.6587	31.0	0.515
Interpretation_T1	Interpretation_T2	−31.977	31.0	0.003
Analysis_T1	Analysis_T2	−0.8195	31.0	0.419
Evaluation_T1	Evaluation_T2	−0.9430	31.0	0.353
Inference_T1	Inference_T2	−13.821	31.0	0.177
Explanation_T1	Explanation_T2	−35.008	31.0	0.001

Cont.

Self-regulation_T1	Self-regulation_T2	−0.9606	31.0	0.344
CrT Skills total score_T1	CrT Skills total score_T2	−23.154	31.0	0.027
Reflection_T1	Reflection_T2	12.806	31.0	0.210
Attentiveness_T1	Attentiveness_T2	14.882	31.0	0.147
Open-mindedness_T1	Open-mindedness_T2	28.525	31.0	0.008
Organization_T1	Organization_T2	−11.495	31.0	0.259
Perseverance_T1	Perseverance_T2	0.0498	31.0	0.961
Intrinsic goal motivation_T1	Intrinsic goal motivation_T2	17.467	31.0	0.091
CrT Dispositions total score_T1	CrT Dispositions total score_T2	22.090	31.0	0.035
Virtual learning environments in economics				
Categorization_T1	Categorization_T2	0.8485	17.0	0.408
Clarifying meaning_T1	Clarifying meaning_T2	−14.917	17.0	0.154
Decoding significance_T1	Decoding significance_T2	−0.9602	17.0	0.350
Detecting arguments_T1	Detecting arguments_T2	0.3378	17.0	0.740
Analysing arguments_T1	Assessing arguments_T2	−60.592	17.0	<0.001
Examining ideas_T1	Examining ideas_T2	−0.1150	17.0	0.910
Assessing claim_T1	Assessing claim_T2	−10.835	17.0	0.294
Assessing arguments_T1	Assessing arguments_T2	−0.6644	17.0	0.515
Drawing conclusions_T1	Drawing conclusions_T2	−10.000	17.0	0.331
Conjecturing alternatives_T1	Conjecturing alternatives_T2	0.0739	17.0	0.942
Querying evidence_T1	Querying evidence_T2	−0.3812	17.0	0.708
Stating results_T1	Stating results_T2	−18.439	17.0	0.083
Justifying procedures_T1	Justifying procedures_T2	−0.4118	17.0	0.686
Presenting arguments_T1	Presenting arguments_T2	−10.891	17.0	0.291
Self-examining_T1	Self-examining_T2	−14.703	17.0	0.160
Self correction_T1	Self correction_T2	−16.596	17.0	0.115
Interpretation_T1	Interpretation_T2	−0.8703	17.0	0.396
Analysis_T1	Analysis_T2	−0.5723	17.0	0.575
Evaluation_T1	Evaluation_T2	−0.8880	17.0	0.387
Inference_T1	Inference_T2	−0.5784	17.0	0.571
Explanation_T1	Explanation_T2	−12.447	17.0	0.230
Self-regulation_T1	Self-regulation_T2	−16.410	17.0	0.119
CrT Skills total score_T1	CrT Skills total score_T2	−10.686	17.0	0.300
Reflection_T1	Reflection_T2	−0.2557	17.0	0.801
Attentiveness_T1	Attentiveness_T2	0.7850	17.0	0.443
Open-mindedness_T1	Open-mindedness_T2	0.3965	17.0	0.697
Organization_T1	Organization_T2	−0.3108	17.0	0.760
Perseverance_T1	Perseverance_T2	0.6026	17.0	0.555

Cont.

Intrinsic goal motivation_T1	Intrinsic goal motivation_T2	−0.4204	17.0	0.679
CrT Dispositions total score_T1	CrT Dispositions total score_T2	0.4503	17.0	0.658
Business communication				
Categorization_T1	Categorization_T2	−0.3663	30.0	0.717
Clarifying meaning_T1	Clarifying meaning_T2	−26.859	30.0	0.012
Decoding significance_T1	Decoding significance_T2	−15.598	30.0	0.129
Detecting arguments_T1	Detecting arguments_T2	0.5229	30.0	0.605
Analysing arguments_T1	Analysing arguments_T2	−0.6325	30.0	0.532
Examining ideas_T1	Examining ideas_T2	−0.6969	30.0	0.491
Assessing claim_T1	Assessing claim_T2	−14.150	30.0	0.167
Assessing arguments_T1	Assessing arguments_T2	0.2358	30.0	0.815
Drawing conclusions_T1	Drawing conclusions_T2	−0.9663	30.0	0.342
Conjecturing alternatives_T1	Conjecturing alternatives_T2	0.0726	30.0	0.943
Querying evidence_T1	Querying evidence_T2	−16.779	30.0	0.104
Stating results_T1	Stating results_T2	0.0000	30.0	1.000
Justifying procedures_T1	Justifying procedures_T2	−25.403	30.0	0.016
Presenting arguments_T1	Presenting arguments_T2	−25.086	30.0	0.018
Self-examining_T1	Self-examining_T2	−0.8522	30.0	0.401
Self correction_T1	Self correction_T2	−0.7801	30.0	0.441
Interpretation_T1	Interpretation_T2	−23.039	30.0	0.028
Analysis_T1	Analysis_T2	−0.5669	30.0	0.575
Evaluation_T1	Evaluation_T2	−0.2976	30.0	0.768
Inference_T1	Inference_T2	−0.8574	30.0	0.398
Explanation_T1	Explanation_T2	−23.360	30.0	0.026
Self-regulation_T1	Self-regulation_T2	−0.9001	30.0	0.375
CrT Skills total score_T1	CrT Skills total score_T2	−15.210	30.0	0.139
Reflection_T1	Reflection_T2	0.2829	30.0	0.779
Attentiveness_T1	Attentiveness_T2	−18.357	30.0	0.076
Open-mindedness_T1	Open-mindedness_T2	−0.1112	30.0	0.912
Organization_T1	Organization_T2	−0.9344	30.0	0.358
Perseverance_T1	Perseverance_T2	−0.9287	30.0	0.360
Intrinsic goal motivation_T1	Intrinsic goal motivation_T2	−0.9752	30.0	0.337
CrT Dispositions total score_T1	CrT Dispositions total score_T2	−12.705	30.0	0.214

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