

Article

Aligning HE Pedagogical Innovation with VET, Industry, and Research Partnerships: Insights on the Demola Portugal Initiative

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Abstract: Academia–industry collaboration has been around for some time, but there has been a shift in both the education and workforce settings to work closely together, coordinating initiatives across all sectors, namely higher education (HE), vocational education and training (VET), and industry, in an attempt to mutually drive innovation, provide opportunities to go from concept to action, encourage entrepreneurship, improve ICT use, and other equally important hard and soft skills, aiming to bridge the existing gap between the teaching–learning arena and the business world. Aware that the VET sector, HE, the government, and industry should be devoted to forging partnerships considered key to the development of research, leading to quality, more business, and ultimately, the economic and social well-being of society, a Consortium of 14 Portuguese Polytechnic Institutions engaged in an innovative pedagogical training program, “Learning based on co-creation processes,” a project within the Demola Portugal Initiative (2021–2023), and at the Polytechnic Institute of Viseu (IPV) with reference No. POCH-04-5267-FSE-000818. This training program, with its active methodologies, is then put into practice through the “Link Me Up—1000 Ideias” project. In our study, we will focus on the needs, expectations, and experiences of the IPV teaching staff and the vocational schoolteachers that participated in the training course. Through the analysis of questionnaires and e-portfolios of the participants in the first two editions (January–June 2021 and September 2021–February 2022), we intend to answer the following questions: (i) Which facilitation skills can be meaningfully used by the teachers participating in the (Demola) Pedagogical Innovation Training course at IPV? (ii) Which tools/platforms can enhance the students’ learning and collaboration among different team members, company representatives, and trainees/facilitators? The data collected confirm that the Demola Portugal Initiative provides an effective approach to bring HE closer to the labor market and keep pace with progress and innovation.

Keywords: academia–industry collaboration; innovative pedagogical training program; IPV teaching staff; VET; Demola Portugal Initiative



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1. Introduction

Higher education (HE) needs to adjust to our fast-paced world of today to better meet the requirements and demands of a labor market that is increasingly calling for quality, innovation, high performance, and co-creation. For that to take place, teaching practices can no longer rely on knowledge transmission and acquisition, resulting from passive methodologies. On the contrary, they should emphasize active student participation, interaction, and co-construction of knowledge, skills, and values. Many studies have recently been carried out on the topic of active learning environments, in which students engage in real, current, international, and market-relevant projects [1–4].

To embrace active methodologies, educational institutions must invest in training and staff development. Particularly, in HE, the teaching staff must envision lifelong learning as a means for facing the future and attempting to answer the challenges and opportunities that arise from partnerships between academia and companies or other organizations.

Training programs that aim to build capacity and equip learners with the skills that the labor market demands are now considered key initiatives. VirtualSpeech, Entr'Apprendre, Passport to Success [5], and the Demola Portugal Initiative [6] are just a few options that offer realistic, immersive scenarios in which trainees explore and experiment with training tools and platforms to engage their teams of students and facilitate positive collaboration and the accomplishment of tasks.

Only then can HE fulfil its mission of teaching and inspiring students, while also leading research and development (R&D) activities, and nowadays also pursuing a third mission (TM), which foresees and encourages the transfer of knowledge to bring about social and cultural improvement together with the economic development of society. These are the three missions of higher educational institutions (HEIs), according to Laredo [7], Abreu et al. [8], Shore and McLauchlan [9], and Schildermans [10], to cite a few. Whether this TM may be more or less related to partnerships with industry, private businesses, and other organizations or to any other rather “nebulous (. . .) and ambiguous” [11] processes or activities involving knowledge and technology transfer, and turning HE into entrepreneurial universities [12], the fact is that it implies a connection to the external world. As stated by the European Universities Association, when setting out the vision for universities in 2030, “ . . . knowledge production can benefit from a dialogue with society, actively involving citizens and non-academic partners such as business, non-governmental organizations, public authorities, and others that share objectives with the university” [13]. Thus, HEIs should have no walls, only bridges with the various national and international stakeholders, namely vocational schools, that play a vital role in advancing scientific, technical, and technological progress.

At the heart of the efforts of HEIs, there is a view to consolidating an open Europe of excellence. Considering the above, the European Universities Initiative has been a priority, and alliances among institutions have now boosted cooperation and the flow of knowledge, “ . . . enabl[ing] students to obtain a degree by combining studies in several EU countries and contribute to the international competitiveness of European Universities” [14]. This initiative, launched in 2018 by the European Council, sowed the seeds of the universities of the future and paved the way for a bolder commitment from academia to increase inter-university cooperation among borders, fields of study, and languages, but never overlooking regional development. The idea, then, is to remain connected to local economies but attempt to respond to challenges that may be of global relevance. Arnaldo Valdés and Gómez Comendador [15] clearly summarize the action steps needed for this goal to be achieved:

“ . . . it involves an institutional transformation (. . .), as they [HEIs] will have to support emerging industries, contribute to public health, disseminate knowledge, and become a reference platform to promote debate on social and scientific challenges (. . .). They will have to engage with society through teaching and research activities, which must be designed to provide an effective socio-economic impact (. . .) and directly contribute to social inclusion by empowering disadvantaged groups and improving communication in their region.”

The challenges are manifold, but this far-reaching mission of creating multidisciplinary and multicultural groups to address and try to find solutions to real-world problems is at the core of today's agenda of HEIs, whether within a consortium of European universities or any other network.

In Portugal, higher education is structured according to 2 main axes: university education (14 public universities accounting for 67% of the total number of study cycles) and polytechnic education (20 public polytechnic institutions), and there are also 6 institutions of military and police HE [16]. Besides this network of public HEIs (76%), there are private schools (24%) also following the same three cycles of studies, i.e., undergraduate degrees, master's degrees, and PhD degrees. The difference between these two main subsystems of education, whether public or private, is the fact that, historically, polytechnic institutions have been more oriented towards practical training and the labor market, as they offer “post-

secondary courses in specialized technology or tertiary education”, while “universities are responsible for ‘developing students’ capacities for design, innovation, and critical analysis’” [17]. However, nowadays, due to the Bologna Process that contributed to making degrees more comparable, the distinction is blurred, strengthening the argument that these two binary systems should merge or, at least, that polytechnics should be granted the right to offer doctoral programs.

In both universities and polytechnic institutions, strategic partnerships have now been encouraged, sharing their best practices, and generating innovation and social value. The Demola Portugal Initiative is one such example.

Starting in September 2021, this partnership joins a Consortium of fourteen Portuguese polytechnic institutions in a program that has two different parts to it:

- (1) A teacher training course project that aims at developing innovative pedagogical practices, through active methodologies and a variety of strategies, such as discussion forums, boot camps, and other open and collaborative spaces in which knowledge is shared intra- and inter-institutionally.
- (2) The implementation of the above-mentioned active methodologies, by the trainees’ performance as facilitators of a team of students, for 8–10 weeks, in which cases/projects/challenges become the vehicle for developing students’ critical thinking and decision-making skills, and also management skills, such as collaborative leadership and communication with their peers, their facilitators, and other stakeholders from both the public and private sectors across national and international arenas.

Even if, in the following pages, we intend to focus on the teacher training course (1), which, at the Polytechnic Institute of Viseu, has been carried out as part of the project entitled “Aprendizagem com base em processos de cocriação” (Learning based on co-creation processes) (POCH-04-5267-FSE-000818), it is important not to forget that the Demola Portugal Initiative only becomes viable when developed in conjunction with the implementation of the project “Link Me Up—1000 Ideias” (2), because that is exactly when the active methodologies are put into practice, in weekly tutorial sessions, in which interdisciplinary teams of students collaborate to solve a societal challenge that had previously been identified by a public or private organization—the partner entity—and designed as a case-based problem by each trainee that participates in the program [18]. From the design and structuring of the case to the public presentation of solution concepts/prototypes or, more broadly, the description of future scenarios, in an institutional/regional pitch, the process implies the management of strategies, tasks, actions, and platforms. The team that the trainee—then, in the role of facilitator—works with is expected to “experiment, challenge, and test assumptions, fail fast, learn, and iterate” [19]. The trainee/facilitator guides his/her team of students, making sure they are all engaged in group work, leading them to critical thinking and probing their knowledge depth throughout the process. However, as Heinrichs notes, these facilitation “... skills are not used in traditional, didactic education and must be learned by the tutor. Tutorial and facilitation styles vary and may have a profound impact on the outcome and the group’s ability to continue the process on its own” [20]. The facilitative role of teachers in supporting their students’ learning has been widely investigated and recognized as key to improving pedagogical practices [21–25].

Bearing this in mind, Demola Global acts as an intermediary between the trainees/facilitators, their teams, companies, and experts, as this Finnish Consulting Group believes that, by participating in these open innovation processes, “[s]tudents receive experience working in real-life business projects as part of their studies, whereas companies get new perspectives and ideas” [26].

Demola Global has been cooperating with “...over 50 universities, 750,000 students, and the leading companies from around the world” [27]. In Portugal, the partnership first started with the Polytechnic of Bragança, in what came to be known as the Demola North Portugal Platform (2017), and it was just in 2021 that a Consortium of fourteen Portuguese polytechnic institutes, the Portuguese government, and Demola Global signed a cooperation agreement, whose aims may be summarized as follows:

The key objective of the program is to create a culture and operative practices to enable cross-polytechnic interaction and effective industry-academia knowledge exchange. From the perspective of higher education institutions (HEIs), collaboration with external organizations create new ideas, highlight research needs and create opportunities to initiate new research. From an educational perspective, it improves teaching practices, brings relevant content to teaching, and creates a foundation for the development of students' professional identities and employability. [28]

After this brief introduction and revision of the literature, in which we gave the reader a glimpse of the critical nature of HEIs as having an entrepreneurial as well as a cultural and social mission, and leaning on the theoretical assumptions underlying the growing importance that is given to academia–industry collaboration [29], we shall now move to a second section that focuses on the “Learning based on co-creation processes” project at the Polytechnic Institute of Viseu. Thus, we analyze the way that this teacher training program is run in the Consortium, and we will particularly focus on the IPV teaching staff that participated in the first two editions (January–June 2021 and September 2021–February 2022), as well as their needs, expectations, and experiences, as a case study. For that purpose, we must also consider their role as facilitators in the Link Me Up—1000 Ideas project (POCI-03-33B5-FSE-072070). Through a reflection upon the training program, as well as a needs analysis, a questionnaire delivered at the end of the course and the trainees' e-portfolios, we intend to identify:

- (i) Some facilitation skills that can be used by the teachers participating in the (Demola) Pedagogical Innovation Training course at IPV.
- (ii) Some tools and platforms that may enhance the students' learning, and collaboration among different team members, company representatives, and teachers/facilitators.

The article concludes with a reflection on the implications of the empirical findings for education and some hints for future research.

2. Participants, Materials, and Methodology

As mentioned above, the Polytechnic Institute of Viseu is one of the participating institutions, along with the Polytechnics of Beja, Coimbra, Castelo Branco, Cávado e Ave, Guarda, Leiria, Portalegre, Porto, Santarém, Setúbal, Tomar, Viana do Castelo, and Bragança. The latter was the first institution to partner with Demola and is the accredited entity (register No. CCPFC/ACC 106925/20) for the training course in Portugal.

The project is funded by POCH—Programa Operacional Capital Humano (the Human Capital Operational Program) in all these institutions, according to call No. POCH-67-2019-12, aiming at enhancing quality and innovation in the education and training system [30]. To be eligible, a criterion was to involve: (i) HEIs that offer advanced professional technical courses (CTeSP) and (ii) vocational schoolteachers and pedagogical coordinators of those courses, thus generating synergies between the two levels of education.

From September 2021 to June 2023, six actions are to be completed, each consisting of eight HEI teachers and two vocational schoolteachers. At the Polytechnic Institutes of Coimbra and Leiria, the number of teachers doubles per action. The training contents are the same in all the polytechnics and Demola trainers have been holding online sessions on Mondays, for one group, and on Tuesdays for the group to which the Polytechnic Institute of Viseu belongs, as we can notice in Figure 1.

The third and fourth joint editions finished on 30 June 2022 and the fifth action started in September, after a pre-session in June, and is about to finish in January. As we already have the training satisfaction report regarding the two first editions (4 January–30 June 2021 and 14 September 2021–4 February 2022), it is time to reflect on the teachers' participation, facilitation, and assessment over that period, after providing the background information needed to understand how this program works.

Even though the training course was initially planned as blended learning, the first two editions were less hybrid than expected because of the COVID-19 pandemic. In fact,

the first batch was fully online, due to lockdown restrictions, and it was only close to the end of the program that the participants could conduct some field visits to some partner entities. In the second batch, there were two boot camps, in which the groups of teachers were divided geographically into North (hosted by the Polytechnic Institutes of Porto and Coimbra) and South (hosted by the Polytechnic Institutes of Leiria and Castelo Branco), besides the visits to the participating organizations.

The training course consists of 344 h (192 synchronous and 152 asynchronous hours), covering the following topics mentioned in Table 1.

TRAINING GROUPS	
M O N D A Y :	T U E S D A Y :
IP Bragança	IP Beja
IP Cávado and Ave	IP Castelo Branco
IP Coimbra, Group 1	IP Leiria, Group 2
IP Coimbra, Group 2	IP Portalegre
IP Guarda	IP Viana do Castelo
IP Leiria, Group 1	IP Viseu
IP Porto	
IP Santarém	
IP Setúbal	
IP Tomar	

Figure 1. Polytechnics allocation per training day (source: Demola).

Table 1. Programs covered in the consortium (source: adapted and abridged from the training materials provided by the Polytechnic of Bragança).

1. Introduction	2. The Co-Creation Process Itself	3. Methods	4. Implementation of Good Practices	5. Assessment as a Continuous Process
Relevance and principles of co-creation projects	Foundations of facilitation and facilitation as a profession	Brainstorming and prototyping tools	How to implement co-creation in formal education?	Introduction of new tools and methods for evaluation and feedback processes
Use of processes and tools to explore future scenarios	Boosting co-creation through facilitation	Validation methodologies	How to evaluate learning in co-creation processes?	Building up feedback
Ideation and prototyping	Examples of co-creation	Value proposition tools and storytelling as a tool	Reflections on the facilitation experience	Development of evaluation data analysis skills
Validation of potential solutions	Models of teamwork development	Documentation of co-creation and learning outcomes	Implementation plans for good practices of co-creation in curricula	
Conceptualization of ideas and the construction process of “demos”	Facilitation of co-creation events	Evaluation tools		

Demola trainers use several platforms to make sure the aims are successfully accomplished. For example, Demola Chat is a collaboration platform with several channels (Demola trainers and all polytechnic institutes’ trainees, Demola polytechnic-specific afternoon trainer and trainees, trainee/facilitator and his/her team of students, and partner organizations) for users to communicate securely in real time while participating in a Demola challenge (cf. Figure 2). Demola Atlas (<https://atlas.demola.net/> (accessed on 28 July 2022)) is another platform that enables each trainee/facilitator to manage contracts, the different tasks of the team, evaluations, and results, as Figure 3 shows. The students use the Demola Portal (<https://portal.demola.net> (accessed on 28 July 2022)) to apply, submit their tasks, and manage their participation in the project Link Me Up—1000 Ideias.

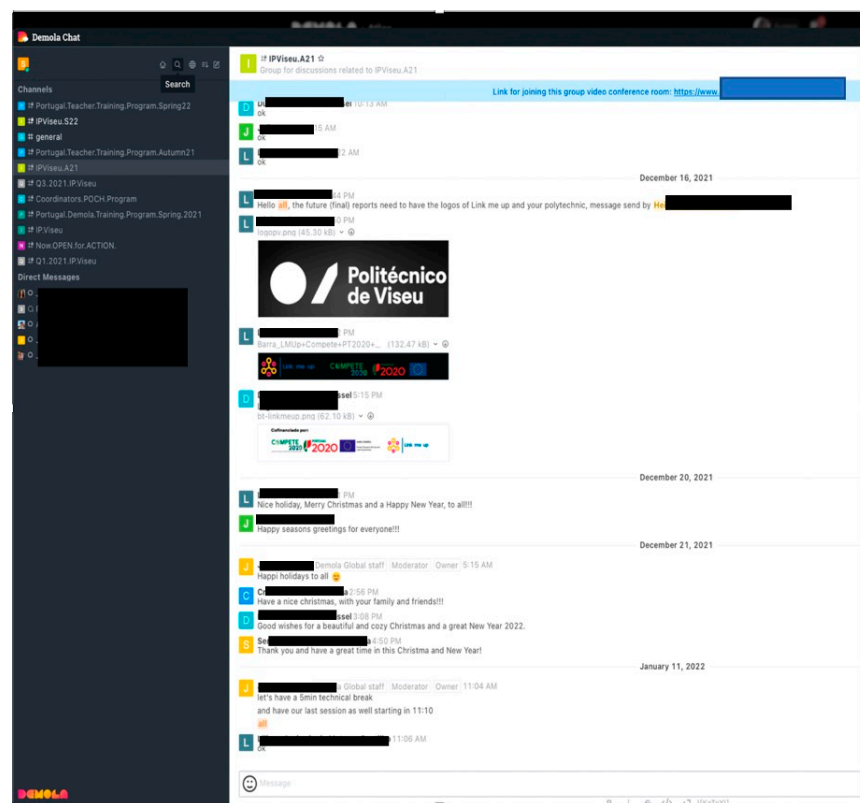


Figure 2. Demola Chat (IPVisu specific channel).

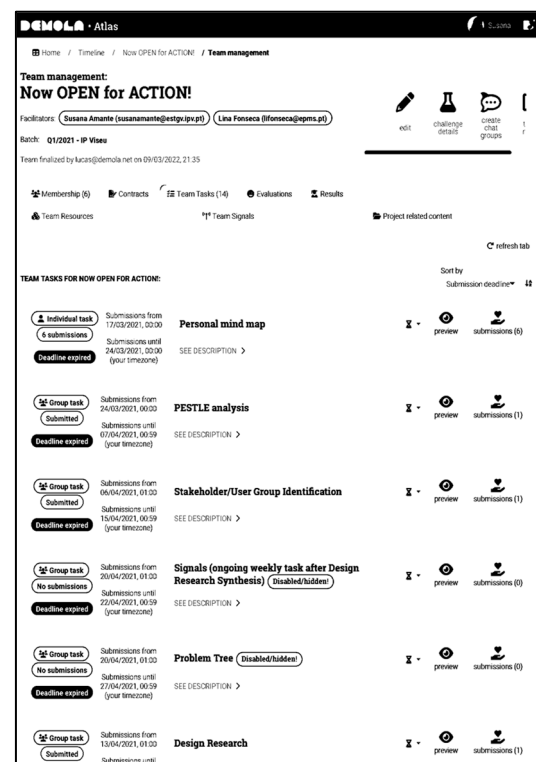


Figure 3. Demola Atlas (management of tasks for one of the challenges).

Miro (<https://miro.com/> (accessed on 3 October 2022)) is a visual online collaboration platform that the trainees are invited to test and use during the training sessions so that later, as facilitators, they may guide their teams, in real time, while they are researching,

developing mind maps, carrying out PESTLE analysis, working on ideation, or any other collaborative activity.

In the first and second batches, the trainees started by choosing and liaising with the partner entities they wanted to work with. The eight societal challenges defined for the first batch are presented in Table 2.

Table 2. Eight societal challenges (first batch).

Challenge	Partner Entity	Further Information
"City of the future: the birth of the smart citizen"	TOMI World	https://portal.cocreationportugal.com/cases/893 (accessed on 28 July 2022)
"Now open for action!"	ACERT	https://portal.demola.net/cases/897 (accessed on 28 July 2022)
"Imagine an inclusive work world"	AVISPT21	https://portal.cocreationportugal.com/cases/900 (accessed on 28 July 2022)
"How to extend your visit experience using technologies"	Lamego Museum	https://portal.cocreationportugal.com/cases/930 (accessed on 28 July 2022)
"Use aromatic and medicinal plants?"	Ervital	https://portal.cocreationportugal.com/cases/943 (accessed on 28 July 2022)
"Dialogic experiences on virtual places"	Visabeira Turismo	https://portal.cocreationportugal.com/cases/944 (accessed on 28 July 2022)
"The future for jobs"	Bizdirect	https://portal.cocreationportugal.com/cases/945 (accessed on 28 July 2022)
"City X Science: GTR? Let's go!"	Viseu Municipality	https://portal.cocreationportugal.com/cases/955 (accessed on 28 July 2022)

We noticed, then, that there was a great diversity in areas and organizations, which ranged from technologies/smart cities to culture, communication, and tourism, social development, health, well-being and sustainability, employability, and community. In the second batch, there were also eight challenges, as shown in Table 3.

Table 3. Eight societal challenges (second batch).

Challenge	Partner Entity	Further Information
"Ethics and Sports"	Cracks Clube de Lamego	https://portal.cocreationportugal.com/cases/1233 (accessed on 28 July 2022)
"Circular food"	Indumape	https://portal.cocreationportugal.com/cases/1293 (accessed on 28 July 2022)
"Automatic Identification in business"	L&C, company	https://portal.cocreationportugal.com/cases/1303 (accessed on 28 July 2022)
"Wine from your land on your table"	CVR Dão	https://portal.cocreationportugal.com/cases/1309 (accessed on 28 July 2022)
"Friends, food, and nature"	ABRE—Associação da Bioregião de S. Pedro do Sul	https://portal.cocreationportugal.com/cases/1320 (accessed on 28 July 2022)
"The fake museum"	Projecto Património,	https://portal.cocreationportugal.com/cases/1321 (accessed on 28 July 2022)
"A sustainable route"	Turismo do Centro	https://portal.cocreationportugal.com/cases/1328 (accessed on 28 July 2022)
"Maintenance and augmented reality"	Sacnor	https://portal.cocreationportugal.com/cases/1344 (accessed on 28 July 2022)

Once again, diversity was a core strength of the program, because it meant that all teachers could work on the topic and with the company that they most related to, or that they found worthy of further research. Besides that, it was also beneficial for the students because they could choose among the many areas represented, this time also including sports/fair play, art, economy, and industrial productivity. Before moving to the analysis of these two editions, it is important to highlight that, in the first batch, each of the vocational schoolteachers co-facilitated a challenge with one of the professors from the Polytechnic Institute of Viseu, while in the second batch the two vocational schoolteachers worked together to co-facilitate the challenge they had designed with the regional association they partnered with, and two professors from the Polytechnic Institute of Viseu co-facilitated another one.

Our analysis will be based on an applied methodological approach, and we can define it as a case study, being descriptive and making use of qualitative content analysis (QCA) to identify thoughts, feelings, and behaviors of the IPV teaching staff participating in the training to help us assess its potential impact on their practices. Through an analysis of the trainees' e-portfolios that documented their work and contained a final report reflecting upon their experiences, we aimed to understand the participants' perceptions regarding the tools, platforms, and the development of facilitation skills. However, because "[s]ocial realities are inherently complex to be grasped in its entirety with one method of investigation" [31], we will also rely on quantitative data, particularly a questionnaire survey answered prior to the beginning of the training course, and another, delivered at a later stage, close to the end of the process, to assess their satisfaction levels. The first questionnaire was a needs analysis resource created by the coordinator of the training at IPV, whilst the second one was developed by the Polytechnic of Setúbal and applied to all participating teachers from the consortium at the end of the training process.

3. Results

Recognizing that lifelong teacher training is both a right and an obligation, aiming at improving professional knowledge, competencies, and performance, needs analysis becomes a necessary tool for action planning and, thus, before the very beginning of every new edition, the participating trainees fill out a questionnaire. Below, we can find the most relevant data regarding the needs, expectations, and experiences of the trainees participating in the first two editions, representing the Polytechnic Institute of Viseu.

In the first edition, we had ten respondents, while in the second one nine out of ten answered the survey questions prior to the beginning of the training course. In both the first and second batches, females were the prevailing respondents (90% in the first, 66.7% in the second), which is surprising because, according to the Pordata database (2022), the number of males employed as higher education teaching staff has exceeded that of females at least from 2001 onwards [32].

Regarding the respondents' age, while in the first edition the predominant age group was 40–49 (70%), followed by 50–59 (20%) and ≤ 60 (10%), in the second, the percentage of those who signed up to participate in the project was the same for the 40–49 and 50–59 age groups (33.3% each), followed by the age group ranging 30–39 (22.2%) and, finally, 60 or over (11.1%).

The respondents' qualifications were very similar in the first and second batches: PhD (70% in the first and 77.8% in the second), master's degree (10% in the first and 11.1% in the second), licentiate degree (10% in the first), and post-graduation (11.1% in the second). The respondents' teaching areas/fields of expertise were quite diverse and encompassed the Humanities, Social Sciences, Natural and Agronomic Sciences, Mathematics, and ICT, and besides these, (Materials) Engineering was also represented in the second batch. This explains the diversity of the challenges and companies mentioned in the previous section of this article.

Both the respondents from the first and second editions acknowledge their commitment to lifelong training (100%), and some claim that they have already used co-creation

methodologies, such as gamification, project-based and problem-based learning, world café, flipped classroom, storytelling, and design thinking.

All the respondents expressed their interest in participating in training courses that enable them to acquire new knowledge and in-depth experience in innovative pedagogical methodologies, in their development and integration of innovation and entrepreneurship curriculum, allied with the development of co-creation projects, which is not surprising because this training is not mandatory and all those who took part in it had to complete an online application form.

These expectations were confirmed by the actual experiences, as we noticed from the trainees' e-portfolio reports, and the questionnaires applied at the end of the course to all trainees/facilitators.

For instance, a trainee/facilitator participating in the second batch uses her e-portfolio to document the exchange of information and interaction with another polytechnic institute from the Consortium, an opportunity which emerged from one of the boot camps and which she considered a valuable contribution to the discussions on the topic:

"I promoted a meeting with 2 other challenges of the Polytechnic of Beja, which involved a company with an interest in the by-product of (. . .) our partner in the [XY] challenge. (. . .) The discussion between students of the 3 challenges in video conference was very rich as it allowed sharing experiences and ideas about the development of the challenges in question." (X.A., 2nd batch, January 2022 [*sic*])

This trainee/facilitator believed it was a great privilege, especially for students, to have a broader understanding of the phenomenon under study, examining trends and patterns and discussing similar issues, bearing in mind other outcomes regarding different companies in the field, but she recognized the whole process as beneficial for all the team, including herself:

"Finally, from both sides, (. . .) this Demola process was very challenging. The students learn a lot in terms of autonomy, creativity, research capacity, organization of ideas, critical analysis, curiosity, adoption of digital instruments, formulating hypotheses, searching for answers that lead to other paths. From my point of view, the biggest difficulty for the students was to discover their creativity, but in the end it was something well achieved."

"For me, as a facilitator, it was a very rich learning experience, as it allowed to develop skills to conduct challenge-based learning processes and helps to create future scenarios in a dialogue between science and business." (*ibidem*)

Another trainee, also from the second batch, attempts to summarize the key skills and the process carried out throughout the facilitation period, envisioning this project as being an important step for future collaboration and further application of findings/results that might prove transposable to other projects:

"The team (including myself and the company) learned lots of new things: from the use of English in real scenarios, since we had to communicate in a foreign language due to the two international students, who were very cooperative, to the need of being autonomous, responsible, able to use digital technologies and new tools that they are now using in other projects and courses by themselves. Being able to come out of the box—and of the academia—forced students to surpass their relationship difficulties and to increase their own confidence." (A.C.A., 2nd batch, January 2022 [*sic*])

Overall, enthusiasm about the training course and the coordination of the projects at the Polytechnic of Viseu was widely reported by the facilitators right from the beginning, as we notice below:

"During the first weeks of the training process, several novelties, activities, and learning took place. We started by meeting the trainers of the Demola team, who, with all their excellent structure and organization, each week instructed us in the

various stages of the process, since contacting companies to collaborate, designing the project together with the company, and selecting students to participate in the project.”

“The meetings with the [institutional] coordinators [of the two projects] were essential and beneficial not only during the first weeks, but throughout the entire process.” (S.L., 2nd batch, January 2022 [*sic*])

However, the trainee’s enthusiasm did not translate into immediate success and there were instances when she found herself a little discouraged. In her words,

“However, it is important to emphasize that not everything was easy. Several setbacks occurred during this process, namely in the initial phase. Lots of information in each session, lots of tasks to do in a short amount of time. Little time to think and formalize the challenge. Contact with the companies did not go very well, most were not available, whose main arguments for denying involvement were lack of time for meetings and the need for part of the project to force them to master the English language. The student selection phase was equally difficult and laborious, some selected the challenge, but in the phase of formalizing their participation in the team, they showed indecision, disinterest, and did not advance.” (ibidem)

Similar constraints and drawbacks had also been identified by trainees/facilitators from the first batch, and Figure 4 below, which was the conclusion of one of the e-portfolio reports, lists the strong and weak points of the training program, which, except for some personal interpretations that are not reliable accounts of what really happened (e.g., the objectives are well-defined from the beginning, the challenge is designed by the trainee in consultation with the company’s representative and the students are involved as soon as everything is set, it is clear that the team are allowed to choose whether they want to follow a solution-based approach or a description of future scenarios, and there are already agreements being signed at the beginning of the process between each company, the polytechnic institute, and the students, etc.), in one way or another were also shared by the majority of the participants:

It is interesting to notice that from the first to the second editions, there were some adjustments regarding the tasks, and that new agreements were signed between some of the organizations participating in the projects and the Polytechnic Institute of Viseu, ensuring further collaboration and maximizing partnerships while embracing, empowering, and engaging students, who are the driving force for innovation and progress.

The results obtained from qualitative data were the same when using quantitative methods. In fact, from the questionnaire survey, carried out by the Polytechnic Institute of Setúbal, and applied to all trainees/facilitators, per polytechnic, in July (first edition) and February (second edition), we realized that the satisfaction levels of the participants at the Polytechnic Institute of Viseu are consistent with what was reported in the trainees’ e-portfolio (Figure 5).

According to a 7-point Likert scale, majority of the respondents claimed that the course met their expectations, with just 20% being undecided in the first batch and 10% in the second. The second edition showed better results, probably stemming from adjustments to the training program.

If we dive deeper into the participants’ level of satisfaction, we find out that 90% of the respondents agreed, though at different levels, that the pedagogical methodologies were innovative. If, in the first batch, the highest percentage (40%) somewhat agreed with the assertion, followed by 30% of respondents that agreed with it for the most part, and 20% that strongly agreed with it, in the second batch the major percentage (60%) agreed with the assertion for the most part, followed by 20% that somewhat agreed with it, and 10% that strongly agreed with it. The remaining 10% in each edition revealed that one teacher was undecided/neutral on the topic in the first edition, while in the second there was a teacher that strongly disagreed that the methodologies were innovative (Figure 6).

STRONG POINTS	WEAKNESSES
STUDENTS: Promoting transversal skills for teamwork Enabling to think and question Enhancing communication skills Learning to deal with and manage uncertainty To train to manage change Train to solve complex and real problems of the community (companies and other organisations) To promote the management of creative projects	<ul style="list-style-type: none"> • Too little time between tasks • They did not have time to process and discuss the various moments of the process • Too much dependence on the facilitator • Unclear objectives of the whole process which led to final frustration • They should have participated from the beginning and created the challenge together with the facilitator
FACILITATOR: Plan, develop and manage a multidisciplinary project team Collaborate in solving real social and societal challenges of the community Work in teams and discuss ideas: brainstorming and other group creativity techniques To help design a Rapid Prototyping Achieve in a team a value proposal for the different stakeholders Changes the teaching-learning perspective by enabling new techniques and processes	<ul style="list-style-type: none"> • Too little time between tasks • Too many weeks to explain a process that is not that complicated • The team with the students and the company should be there from the beginning of the process • The challenge should be thought of with the whole team • The development of the process is unclear. We arrive at the end without knowing what is really intended. if a solution to a problem of the company, if a reflection on a problem • Motivation cannot only be process-focused, it must also be outcome-focused
COMPANIES/ORGANISATIONS: Bringing Companies/organisations closer to Education Offer a participation interface and support for creating ideas, products, solutions, with gains for the Company and for the Students. Allows solutions to real problems posed by companies to higher education institutions. It puts scientific research at the service of business and the needs of society.	<ul style="list-style-type: none"> • It should be the company that chooses the challenge • The process should be focused on solutions to the challenge/problem posed by the company • There should be the possibility of establishing a protocol between the company and the higher education institution where there could be gains for both parties • Companies should be made more aware of the importance of collaboration between scientific research and society

Figure 4. A report conclusion (C.S., first batch, June 2021 [sic]).

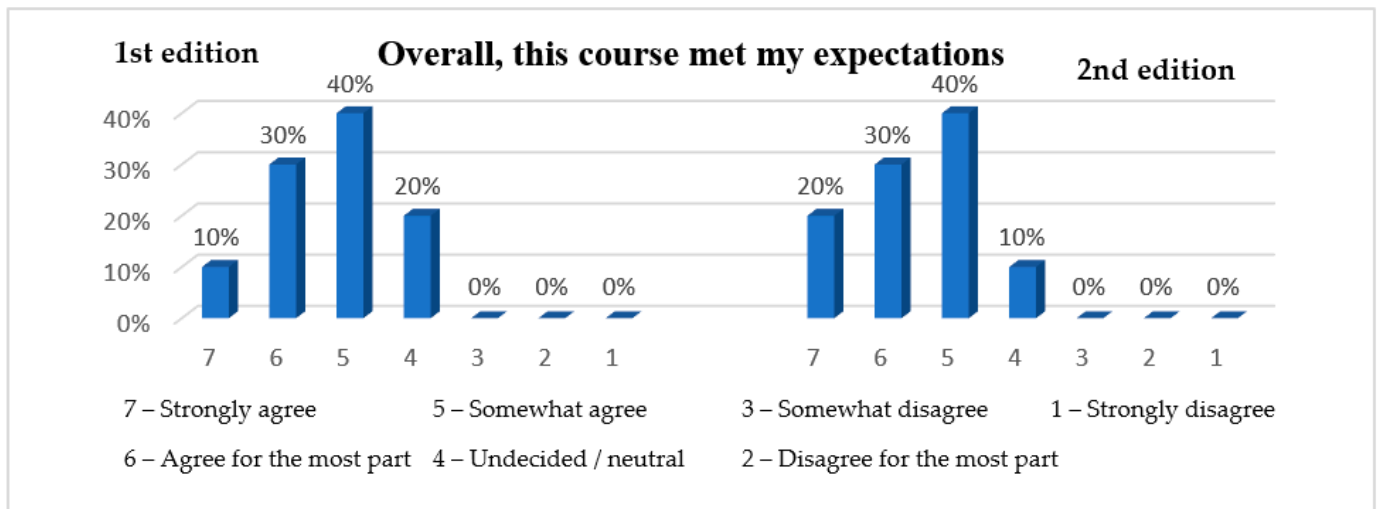


Figure 5. Expectations of trainees regarding the training program.

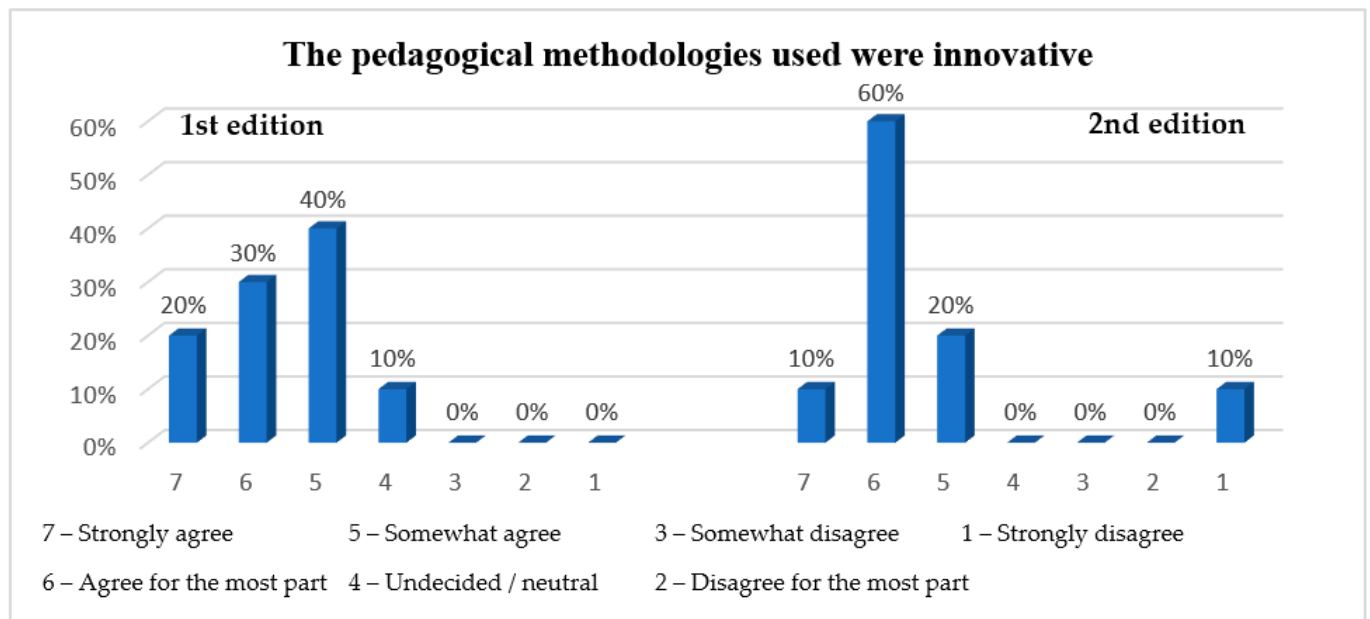


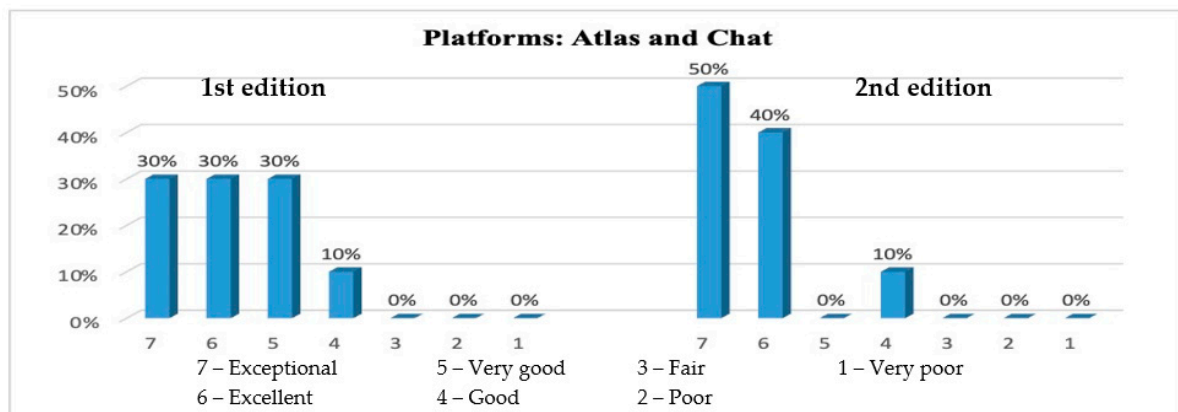
Figure 6. Perspective of trainees on the pedagogical methodologies.

The questionnaire considered other important questions, such as if the course was well-structured, if the development of the action was balanced with practical and theoretical parts, if the objectives of the course were achieved, if the blended-learning model was appropriate to the course, if the trainers made the sessions more dynamic by adapting the themes to the group, if the trainers had a good grasp of the issues and were able to clarify all the questions, if the materials prepared for the training were useful, and if the dynamics helped to build awareness of the topics. Taken together, and summarizing the results, we may say that the overall satisfaction of the trainees with the program reached a higher mean percentage in the second edition, even though it was also quite positive in the first, as can be seen in Table 4.

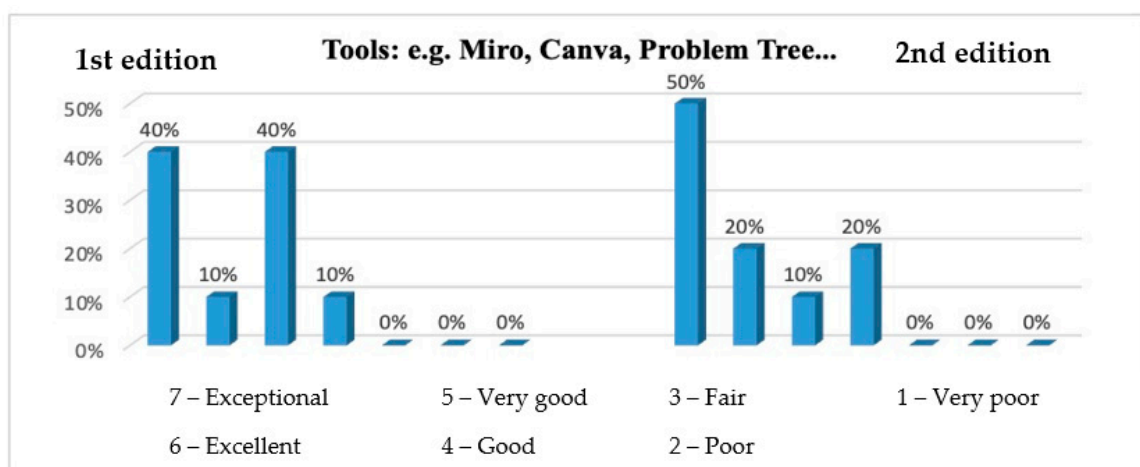
Table 4. Overall satisfaction with the program.

Valid	First Edition		Second Edition	
	Frequency	Percent	Frequency	Percent
4	2	20.0	1	10.0
5	3	30.0	3	30.0
6	4	40.0	5	50.0
7—Fully satisfied	1	10.0	1	10.0
Total	10	100.0	10	100.0

The respondents' perspective on the platforms used, such as Atlas and Demola Chat, drew consensus from the two groups (Figure 7), despite being more valued by the participants in the second batch, following the same trend thus far.

**Figure 7.** Perspective of trainees on the platforms used.

The tools, particularly Miro, Canva, Problem Tree, and PESTLE analysis, among others, are recognized as essential to the process of facilitation and to tackling the challenges being worked on, resulting in even more positive feedback, as shown in Figure 8.

**Figure 8.** Perspective of trainees on the tools.

As we can see, in the second edition, the respondents were fully satisfied with the tools they were introduced to, and the same held true for the trainees participating in the first edition.

The same high levels of satisfaction could also be found in both editions because of the partnership and networking among the members of different educational institutions, not just from the same region but also from different polytechnic institutes and vocational schools, and even due to internationalization. The development of skills, such as good use of English, communication skills, creativity, entrepreneurship, leadership, and digital skills, are the ones that the trainees considered they developed the most because of the training program, but others such as planning, setting guidelines, reframing, being flexible, negotiation, leadership, and group management were also key in influencing the team's decision-making process and outcomes.

4. Discussion

The data collected above, as part of the results of this study, are relevant because the percentages and the excerpts from the final report, within the e-portfolio, allowed us to know the profile of the teachers that invest in their lifelong learning and development, and also their perception of the training tools, platforms, and methodology, with a view to incorporating co-creation in their work with their students in the future. The findings allowed us to obtain a better understanding of the value that the teachers participating in the training project, as trainees and as facilitators, place on innovative practices that integrate entrepreneurial thinking, creativity, leadership development, adaptability, and opportunities for internationalization.

Delving deeper into the interpretation of results, it seems important to mention that a likely reason for women to be more participative in this training program, despite the gender imbalance in HE, might be the fact that women feel they need to invest more in training and development initiatives than men to progress through their careers and up the career ladder. The chapter entitled "Career advancement and participation in decision-making" in the *She Figures 2018 Report*, published in 2019 by the European Commission, is consistent with these assumptions, as it shows that the percentage of women in academia is still low vis-à-vis that of men [33]. The same was also found in other scientific articles, where we can read that women are "...being asked repeatedly to prove one's legitimacy as scholars or teachers..." [34].

Bearing in mind the distribution of the respondents' age groups, we may assume that innovative pedagogical practices significantly correlate with job stability and progression.

Facilitation skills, such as planning, active listening, flexibility, team building and managing group dynamics, (collaborative) leadership, enabling reflective thinking, and interpersonal communication were some of the competencies required to facilitate the challenges, keeping everyone on track and encouraging thoughtful participation not just from the group of students, but also from experts and other stakeholders.

Many platforms and tools were used in the process to collect data (e.g., surveys, interviews), identify weak signals and megatrends, and develop multiple scenarios (e.g., 'what if...' questions) to manage and enhance the students' learning and co-creation of knowledge. The benefits are clear for all the actors involved (companies, the public sector, students, and universities), however, since the focus in this article was on trainees/facilitators, here, we outline and summarize the main points, taking into account the results obtained, and that had also been identified in other programs where the Demola methodology had been used, namely in different settings, such as in Spain [35]:

- Development of a new kind of teaching and learning environment as well as new co-operation opportunities.
- Improvement of the training skills and methods of lecturers.
- Researchers and lecturers are also given the chance to work in a real-life environment, implementing and validating their ideas and their research outputs.
- Opportunities to create and maintain contacts with the industry and link scientific research to industrial cases through this cooperation.

All this was also possible for the IPV teaching staff participating in the first and second editions of the Demola Portugal Initiative and, through their lens, we can understand the

critical impact of programs such as this one to ensure innovative teaching approaches, which make use of valuable tools, platforms, and other mechanisms that lead to effective learning by building bridges between motivated students and the—research and labor—world outside.

5. Conclusions

This last section could be named implications of the empirical findings for education and some hints for future research because in these next few paragraphs we intend to look back and briefly reflect on the most significant changes and trends emerging from the past two editions of the Demola Portugal Initiative, but also look forward to the editions to come and to the bright future that lies ahead.

In light of the above discussion, and bearing in mind what Amante et al. reminded us of, that “[e]ntrepreneurship education has been increasing, and pedagogies that promote experiential learning, that is, that are action-oriented, have been gaining an enormous amount of attention from academia and the business world alike” [36], we might expect collaboration between the VET sector, HE, and the industry to be further strengthened in the years to come. Dynamic classrooms that foster positive peer collaboration and knowledge sharing among several other stakeholders that do not belong to educational settings are now contributing to active learning environments. Thus, rather than following traditional approaches, the teachers have now started to feel the urge to innovate pedagogically and learn to become facilitators of real-world challenges, involving their students in project-based learning projects.

The Demola Portugal Initiative, particularly through the training course entitled “Learning based on co-creation processes”, has been supporting this change and helping teachers become facilitators. As the last pages of a trainee’s e-portfolio from the first batch highlight (Figure 9), teachers become well-aware that active collaboration within and outside academia leads to the development of synergies, allows the transfer of research results, and benefits society at large.

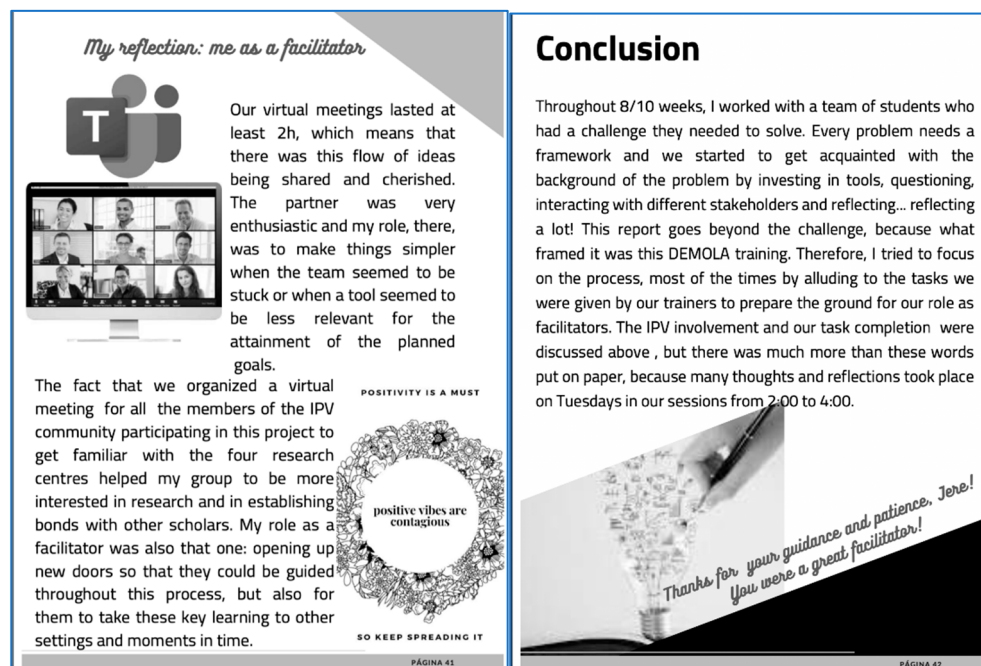


Figure 9. Reflection upon the process (A.S., first batch, June 2021 [sic]).

As coordinators, we were in charge of making sure everything ran smoothly and, thus, we constantly supported our colleagues, summoned meetings, and assisted with everything they needed. At the end of the fifth action, some changes were already in place,

such as more face-to-face sessions now that the COVID-19 crisis seems to have subsided, and that will certainly open up new opportunities, new contacts, and new experiences that will help develop new tools, skills, scenarios, and products that reconfigure best practices and drive innovation. Future research comparing the online editions to the fifth and sixth editions is necessary to evaluate the effectiveness and impact of the training program, particularly because of the two last editions' increase in the number of boot camps.

This study has provided us with information of a program that has been very successful in encouraging the development of human capital, by turning teachers into facilitators, who make use of new tools, methods, and facilitation techniques that will contribute to actively engage academia, the research community, and the workforce in a productive dialogue that enhances knowledge and practice. This model of training by Demola, described here, is certainly useful for other capacity-building programs targeted at promoting professional development and networking opportunities in academia.

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Institutional Review Board Statement: Regarding our manuscript having passed an Ethics Committee or Institutional Review Board Approval, the application for this project dates back to December 2019 (call no. POCH-67-2019-12, available online at <https://www.poch.portugal2020.pt/pt-pt/Candidaturas/Documents/Aviso%20n%C2%BA%20%20POCH-67-2019-12.pdf> (accessed on 28 July 2022)) and the creation of our Institutional Review Board dates back to the same time, with the first meetings taking place from March 2020 onwards, a time when the Consortium of this project was already creating questionnaires and all the training materials. However, as this is a project that was financed by the following funding agencies: POCH, Portugal 2020 and the European Social Fund, approved on 18/06/2020, aiming at the improvement of quality and innovation of the educational and training system in Portugal, and that implied the application of a consortium of 14 Polytechnic Institutes in Portugal, namely the Polytechnic Institute of Viseu, having been assessed by an external Jury, it completely fulfills all external and internal ethical requirements.

Data Availability Statement: All data supporting results are archived by the Steering Committee at IPV and were sent to the Funding Agency: POCH—Programa Operacional Capital Humano (the Human Capital Operational Program).

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