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Capturing the Value of Demola  
at Instituto Politécnico de Setúbal - Promoting Youth  
Employability through Problem-Based Learning

Maria Zita Gonçalves da Costa Marques Guerra

Mestrado em Educação e Sociedade

Orientador:

Doutor Rui Vinhas da Silva, Professor Catedrático,

Iscte - Instituto Universitário de Lisboa

junho, 2022



SOCIOLOGIA  
E POLÍTICAS PÚBLICAS

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Departamento de Sociologia

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## Dedication

This thesis paper is dedicated to my family and friends.

A special feeling of gratitude to my loving mother Zita, a very gifted Mathematics teacher, who touched everyone with her joy of living, willpower and attitude towards lifelong learning.

I also would like to thank my dear children, Zita and João, for being my constant supporters and for inspiring the dissertation theme. I hope that this study may help them, and many other students, to better integrate the labor market and become active and constructive citizens.

## Acknowledgements

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Last, but not least, I would like to thank my thesis advisor, Professor Rui Vinhas da Silva, for always being available and helping me to steer in the right direction.

## Abstract

A elevada taxa de desemprego na União Europeia representa um desafio económico e social que necessita de ser ultrapassado de forma a permitir coesão e crescimento do mercado. Este estudo demonstra que práticas de Cooperação Educação-Indústria criam valor em termos de integração no mercado laboral. Em particular é estudada a forma de avaliar e comunicar o valor do programa *Demola*. O *Demola* é uma ferramenta de Cooperação Educação-Indústria, com raízes no modelo de inovação da Tripla Hélice, que junta equipas de estudantes multiculturais e interdisciplinares, guiadas por professores previamente formados (Facilitadores), com o intuito de encontrarem soluções para problemas reais de empresas (Desafiadores). A base do estudo é um inquérito qualitativo que foi levado a cabo no Instituto Politécnico de Setúbal (IPS), uma instituição pública de ensino superior portuguesa, tendo sido envolvidos os *stakeholders* do *Demola* (estudantes, professores, empresas e os representantes institucionais do IPS e do *Demola Global*). As conclusões deste estudo mostram que todos os *stakeholders* beneficiam do *Demola*, embora de diferentes formas. As principais limitações deste estudo são a reduzida dimensão da amostra e a subjetividade na perceção dos benefícios. São identificadas várias áreas para futura investigação, sendo as mais importantes as necessidades de uma taxonomia de Cooperação Educação-Indústria aceite de forma generalizada, bem como de ferramentas de avaliação. O principal desafio de investigação que identificamos no *Demola* é a pesquisa de indicadores que possam aumentar ainda mais a credibilidade educacional desta ferramenta.

## Palavras-chave:

Cooperação Educação-Indústria

Modelo da Tripla Hélice

Educação sobre Empreendedorismo

Empregabilidade

Aprendizagem baseada em Problemas

*Demola*

## Abstract

High youth unemployment rate in the EU is both an economic and social challenge that needs to be overcome to allow for market cohesion and growth. This research demonstrates how Higher Education-Industry Cooperation (HIC) practices create value in terms of labor market integration. In particular it studies how the value of *Demola* can be evaluated and communicated. *Demola* is a HIC tool with roots in the Triple Helix model of innovation which brings together teams of multicultural and interdisciplinary students, guided by a previously trained teacher (Facilitator), to solve real-life problems posed by companies (Challengers). The basis of this study is a qualitative survey that was carried out at *Instituto Politécnico de Setúbal (IPS)*, a Portuguese public high education institution, involving *Demola* stakeholders (students, teachers, companies, and both the institutional representatives from *IPS* and *Demola Global*). This study's findings show that all stakeholders benefited from *Demola*, although in different forms. The key limitations of this research are the small sample size and the subjectivity of perceived benefits. Several key areas of future research are identified, whereby most importantly the need for commonly accepted HIC taxonomy and evaluation frameworks. We identify *Demola*'s main challenge as researching objective evaluation indicators that could further enhance this tool's educational credibility.

## Keywords:

University-Business-Cooperation

Triple Helix Model

Entrepreneurship Education

Employability

Problem Based Learning

*Demola*

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## 1. Introduction

The Fourth Industrial Revolution, driven by technology, demands adaptability. According to the World Economic Forum January 2016 Report, the most in-demand occupations did not exist in the recent past and the pace of change is expected to accelerate. Companies are challenged by shorter product life cycles which require a flexible workforce and increased innovation capability (Davey et al., 2016).

In face of increasing global competition, European governments aim to develop their industrial economies into knowledge societies to assure sustainable job creation, fostering economic growth and social cohesion (Davey et al., 2016). However, the youth unemployment rate has reached 14.9 % in the EU, as of December 2021. This figure is more than double of the overall EU general population unemployment rate (Eurostat, 2022), both naturally impacted by the COVID crisis. This unused labor capacity has important social and economic impacts. In this context, the European Commission considers as a priority the employability, promotion of entrepreneurial behavior (Plewa et al., 2015) and self-employment (Davey et al., 2016).

Value is a ubiquitous concept in the business world and it is represented as the combination of economic and non-economic aspects (Almeida et al., 2021). Research shows that providing information about University-Business Cooperation's (UBC) value is one of the easiest and most effective ways to support it (Alunurm et al, 2020).

The research question addressed by this work is to evaluate the value of Higher Education Cooperation activities, in particular the contribution of *Demola*, a Finnish co-creation tool, for its stakeholders in developing the competences that can support a better labor market integration for higher education students. This research focuses on the case study of a Portuguese Polytechnic School in the 1<sup>st</sup> semester of '21/'22.

This paper is structured as follows: First, the theoretical background is presented via a literature review of relevant associated topics, namely Triple Helix Model, University-Business Cooperation, Employability, Problem-based Learning, Entrepreneurship education and *Demola*. In the subsequent sections the research methodology is described. Then follow by the data analysis and discussion of the findings. Finally, the limitations of the study are described, and the last section suggests future research directions.

The results of this study contribute to show the value of *Demola* in particular, and of HIC tools in general, to promote employability, and specially youth employability.



## 2. Literature Review

The search for relevant papers and articles was carried out over the English literature indexed by the Web of Science, Scopus and Google Scholar databases with temporal restrictions (2010-2022). Priority was given to articles that have been peer-reviewed, and to the ones with higher number of citations. The search was enlarged to include the references cited in the 1<sup>st</sup> round of papers and articles.

The keywords searched for in the title or abstract of the material were: *Demola*, Employability, Entrepreneurship Education, Problem Based Learning, Triple Helix Model and University-Business-Cooperation.

### University-Business Cooperation

University-Business Cooperation (UBC) can be defined as the cooperative interactions, formal or informal, between universities and businesses targeting mutual benefit (Galan-Muros & Plewa, 2015).

Some authors (Alunurm et al., 2020) move away from the UBC terminology to a more embracing Higher education-Industry Cooperation (HIC) concept, proposing a five-step cooperation process model: 1) Motivation 2) Choosing a cooperation form, 3) Engagement, 4) Outputs and 5) Impacts.

UBC, as a discipline, only emerged around 30 years ago as a result of top-down governmental approaches. It is regulated by policymakers in different fields (education, science, technology and industry), and different levels (local, regional, national and international), therefore requiring an integrated policy mix (Galan-Muros & Davey, 2019).

Increasing UBC research reflects the importance of innovation arising from knowledge transfer between universities and businesses, which generates competitive advantages with significant impact on social and economic development (Galan-Muros & Plewa, 2015; Galan-Muros & Davey, 2019). High youth unemployment in several European countries since the 2008 economy crisis has made policymakers more interested in UBC contribution to graduates' employability (Pavlin, 2016). UBC has also been increasingly regarded as a powerful regional innovation tool (Mascarenhas et al., 2018) for economic growth and sustainability (Quintana et al., 2016). The European Union has invested impressive amounts of funds for several years on

UBC incentives and therefore it is important to study their social and economic impacts (Galvao et al., 2019).

UBC is still at its early stages of development due to a lack of commonly accepted definitions of many related concepts (Galan-Muros & Plewa, 2015; Galan-Muros & Davey, 2019) and lack of awareness of its benefits (Epure & Vasilescu, 2016). One of the most relevant, but less advanced, UBC research priority areas is the need for metrics that allow for a better comprehension (Orazbayeva et al., 2019). UBC outcomes vary in tangibility, formality and timing of impact and the failure of converting UBC outputs into outcomes and impacts has been inhibiting the dissemination and use of this paradigm (Galan-Muros & Plewa, 2015; Galan-Muros & Davey, 2019).

Although there is an increasing pressure to capture the value of UBC, there is no commonly accepted framework for assessing its results and impacts. Recent work (Galan-Muros & Davey, 2019) proposes the UBC Ecosystem which is a framework for assessing the UBC process implementation, distinguishing between UBC Outputs, UBC outcomes and UBC impacts. UBC outputs are the tangible and short-term products, services or other properties that result for each stakeholder, at an individual / organizational level, for example academic publications or business patents. On the other hand, UBC outcomes are the direct results of UBC outputs, at the individual/organizational/community level, positive or negative, over a wider time period, tangible or intangible, for example improved soft skills by students or access to qualified students. Finally, UBC impacts are the indirect changes, intended or unintended, that result from UBC for individuals, institutions and societies, for example improved students' employability or better suitability of curriculum content (Galan-Muros & Davey, 2019).

Another existing research gap is the study of the implementation of UBC in less developed regions (Ishengoma & Vaaland, 2016; Mascarenhas et al., 2018), the ones that could benefit from it the most.

UBC can take place in any of the three Higher Education Institution (HEI) missions (education, research and valorization). In the education domain, UBC can take the form of joint curriculum design and delivery, student mobility via for example internships, and life-long learning. In the research domain UBC typically takes the form of professional mobility (temporary movement of employees between HEIs and companies) and collaborative R&D. Finally, in the valorization domain UBC happens through the commercialization of R&D results and entrepreneurship (Galan-Muros & Plewa, 2015, Galan-Muros & Davey, 2019).

There is no “one size fits all” UBC, because UBC is jointly impacted by three levels of elements, each with a broad spectrum: the individual, organization and environment. Individual factors can range from age, gender, field of knowledge to experience level. Organizational factors can be e.g. the HEI size or type. Literature suggests that HEIs in applied knowledge fields like for example polytechnics and universities of applied sciences, are typically more connected and therefore more engaged with industry. Environmental factors include social, economic, political, legal and technological contexts. This means that successful UBC activity needs to first understand its unique context and only then find tailor-made solutions (Galan-Muros & Davey, 2019).

HEIs that are highly committed to UBC typically have dedicated resources, communicate externally their UBC efforts, use extensively their alumni network, and promote the representation of academics on company boards and business people on their boards (Plewa et al, 2015). At the HEI level, the management of UBC is typically decentralized i.e. taking place at an individual or unit level, lacking integration and coordination, with efficiencies and economies of scale often compromised (Galan-Muros & Davey, 2019).

Research shows that drivers and barriers differ according to the type of UBC activities, and that the encouragement of key drivers should be prioritized over the reduction of barriers (Galan-Muros & Plewa, 2015).

The existence of good personal relationships is the most important factor in facilitating UBC overall, which ultimately depends upon mutual trust, institutional and individual commitment, and shared goals (Galan-Muros & Plewa, 2015; Rampersad, 2015; Pavlin, 2016). This implies that UBC is not a quick-fix solution that can be imposed (Mascarenhas et al., 2018).

Individual academics are key drivers of UBC, because they initiate and facilitate joint activities (Clauss & Kesting, 2017; Orazbayeva et al., 2019), but the existing selection and incentive systems for university staff do not take UBC competence or experience into account (Mascarenhas et al., 2018, Orazbayeva et al., 2019, Compagnucci & Spigarelli, 2020). Research shows that, on top of psychological attributes, autonomy, competence and relatedness also increase academic participation in UBC activities. Academics need to participate willingly in UBC related activities, to feel capable to perform them, and finally they need to feel that their surrounding university environment shows a positive attitude towards UBC. This UBC

competence and relatedness require that UBC-related accomplishments of individual academics be recognized and disseminated (Orazbayeva et al., 2019).

Research shows that one of the most important UBC barriers are the cultural differences between universities and businesses, namely their differing motivations and time horizons. Whilst academia takes a long-term view on the generation and dissemination of new basic knowledge, businesses typically target applicable knowledge used to generate short term economic value (Galan-Muros & Plewa, 2015). One of the challenges in innovation which applies inevitably to UBC as well is the time lag between investment in research and the effective delivery of results. The average time lag is about 7 years and tends to be even longer for large firms as the complexity of their projects is also higher (Mascarenhas et al., 2018). A recurrent barrier to UBC cooperation is that academics aim for detailed and publishable results whereas companies want solutions that are protected from competition (Alunurm et al., 2020). As knowledge sharing in UBC is often associated with intellectual property (Ranga & Etzkowitz, 2013), governance mechanisms that serve mutual objectives need to be in place (Claus & Kesting, 2017).

Important UBC outcomes for students are the development of competencies which are sought by the labor market (Pavlin, 2016). UBC activities contribute significantly to students' employability because of the development of entrepreneurial skills (Orazbayeva et al., 2019).

For academics UBC provides opportunities to cover knowledge gaps, implement new research and teaching, develop new skills and access resources (Quintana et al., 2016; Orazbayeva et al. 2019).

Companies involved in UBC achieve bigger innovation capacity (Pavlin, 2016) by gaining access to talented students and building networks with the academics setting their sight towards opportunities for future collaboration (Quintana et al., 2016).

Research shows that providing information about UBC is one of the easiest and most effective ways to support UBC (Alunurm et al., 2020). Research has shown that once a UBC activity takes place there is then a greater potential for other UBC events to occur (Galan-Muros & Davey, 2019) while the geographical proximity is a potentializing factor (Mascarenhas et al., 2018).

## Triple Helix Model

Traditionally, government, industry and university acted in isolation (Orazbayeva et al., 2019).

In contrast, the Triple Helix Model, created by Etzkowitz in 1993, is an economic development model, demonstrating the importance of university-business-government relationships in regional and national economic growth (Galvao et al., 2019). The Triple Helix Model explains the shift from the Industrial Society, based upon the industry-government set, to the Knowledge Society, rooted on the interactions between education, industry and government (Ranga & Etzkowitz, 2013).

This model has been widely studied in Europe, the Americas and Asia, but is basically unexploited in Africa where its impact could probably yield the most value (Galvao et al., 2019).

The Triple Helix Model has been evolving over time, giving birth to quadruple helix models that include the civil society and quintuple helix models that are ecologically sensitive, encompassing the environment (Galvao et al., 2019).

HEIs were held accountable for teaching and research, but in the context of the Triple Helix Model the HEIs assume a 3<sup>rd</sup> mission which is of driving regional innovation and economic growth (Galvao et al., 2019, Orazbayeva et al., 2019).

The shift from research universities to entrepreneurial universities originated in the USA in the late 19<sup>th</sup> century, namely with Massachusetts Institute of Technology and Stanford University. Still today universities are more entrepreneurial in the USA than in Europe, and probably this is due to funding policies. In the USA universities are traditionally funded privately, whilst in Europe most of them operate from public funds (Compagnucci & Spigarelli, 2020).

The 3<sup>rd</sup> mission of universities includes all activities that generate, use, apply and exploit HEI resources beyond the academic environment, ranging from patenting to soft skill promotion. Research shows that the three missions of the universities should complement and potentialize each other (Compagnucci & Spigarelli, 2020).

Triple Helix systems can accelerate the transition from small risk, slow innovation and therefore slow development models to more added value development models creating more markets, jobs and skills (Ranga et al., 2013). Research shows that the knowledge transfer from universities to companies increases innovation, which improves companies' financial

performance (Teixeira et al., 2019). Moreover, innovation potential is highest when there are no-risk, or at least low risk, knowledge exchange areas (Nakagawa et al., 2017).

Innovation is a key driver of EU competitiveness as demonstrated by the Horizon Europe Programme for research and innovation, worth € 95,5 billion (Horizon Europe Programme, 2022). Innovation policy has taken various forms in Europe: whilst some countries act alone and focus on specific regions, some concentrate on overall small and medium-sized enterprises (SME) policy, and others (e.g. some European Nordic regions) have adopted a more sophisticated path towards creating regional clusters of SMEs in line with the EU *smart specialization* policy rooted in each region's competitive advantages (Ranga et al., 2013). Indeed, regional inequalities can be overcome through the creation of business eco-systems based upon innovation and co-creation (Galvao et al., 2019).

The balanced configuration of all three players in the Triple Helix Model is the one that predominantly facilitates innovation because the intersections of the spheres present the most fruitful scenarios (Ranga & Etzkowitz, 2013).

The *helix spaces* are seen as “stem cell spaces” which later, triggered by context-based needs (e.g. regional needs), differentiate themselves according to the specific components, relationships and functions involved (Ranga & Etzkowitz, 2013). Knowledge sharing is context-bound as it is impacted by the organizational environment and governance system of each stakeholder (Clauss & Kesting, 2017).

Also, knowledge has evolved from intra-disciplinarity to trans-disciplinarity and this shift is making business networks and R&D alliances more relevant, as they reduce R&D costs and risks (Galvao et al., 2019). In this context HEIs can be an important knowledge source for SME's because the outcomes are often public, replacing the expensive R&D investments which these types of companies cannot afford (Alunurm et al., 2020).

In the Triple Helix system, it is crucial to recognize the importance of individual innovators and specifically their role as initiators of this process. These people typically are visionaries and occupy key institutional positions that enable them to bring these three players together (Ranga & Etzkowitz, 2013).

For Universities to embrace their entrepreneurial mission it is necessary for academia to develop entrepreneurship capacity internally (Ranga & Etzkowitz, 2013). Additionally, many European governments have been creating the conditions, namely the legal framework,

necessary to allow them to evolve from the “*ivory tower*” of teaching and research (Mascarenhas et al., 2018).

It is clearly impossible to have a single 3<sup>rd</sup> mission performance evaluation model applying to all countries and universities because the activities need to be evaluated with consideration to each university’s profile and its specific socio-economic environment (Compagnucci & Spigarelli, 2020).

There is a need to assess the performance of Triple Helix Models, but unfortunately there is a scarcity of indicators capable of capturing the associated dynamic processes (Ranga & Etzkowitz, 2013).

Increasing demands for transparency, efficiency and accountability also have made it urgent to measure HEI’s socio-economic impact (its 3<sup>rd</sup> Mission), but this evaluation has proved to be difficult for several reasons such as: a) the heterogeneity of activities that makes them difficult to compare; b) the difficulty of defining indicators to measure intangible assets such as the soft skills acquired; c) lack of specific data on the 3<sup>rd</sup> Mission activity. To develop 3<sup>rd</sup> Mission indicators comprehensive data on the universities entrepreneurial mission activity is required (Compagnucci & Spigarelli, 2020).

### Entrepreneurship Education

Entrepreneurship can be defined as an innovative venture that allows the creation of wealth, necessarily context-bound and limited to a set of resources (Farhangmehr et al., 2016). It is a complex process because of the uncertainty involved (Huang-Saad et al., 2018).

Entrepreneurship Education (EE) at universities started in 1940, but only began to spread after the 1960s. The USA has been leading in this educational area, followed by Europe at a slower pace, with big heterogeneities between countries (Davey et al., 2016). Harvard Business School offered the first entrepreneurship class after World War II as response to industry challenges (Huang-Saad et al., 2018). Recently, the European Commission started the “Entrepreneurship Action Plan 2020” which has as its main objective the promotion of entrepreneurship in schools and universities (Pardo-Garcia et al., 2020).

One should distinguish EE from typical management and business education because the latter focuses on managing a business whilst the former deals with business entry and creation (Sirelkhatim & Gangi, 2015).

EE is a field of education that has been growing globally based upon the assumption that it is associated with employment generation and overall economic growth (Sirelkhatim & Gangi, 2015). Nevertheless, the fact is that the study of entrepreneurship is still at its early stages (Farhangmehr et al., 2016). Research related to EE is progressing slowly and has focused mainly on empirical studies, namely individual institutions and their programs, not sufficiently exploring the link between the educational activity and actual outputs such as graduate employability (Pittaway, 2007).

There are still many debates about whether entrepreneurship skills can be taught at all, who is qualified to teach them, where they should be taught from (Pittaway, 2007, Sirelkhatim & Gangi, 2015), and whether personality traits matter more than behavioral characteristics. The behavioral approach believes that indeed entrepreneurship skills can be taught, although there are open questions regarding the contents and methods of teaching (Farhangmehr et al., 2016). One of the ongoing debates is whether entrepreneurship education should be taught at universities, because of the fear that research and knowledge may get “contaminated” by industrial or personal interests (Davey et al., 2016).

Entrepreneurship education was in the past mainly associated with learning the tools that led to self-employment, but more and more it is being perceived as the acquisition of transferable skills that can be used to identify and grab any business opportunity, independently of being self-employed or not (Artess et al., 2017). Training students’ entrepreneurial skills can strengthen the self-employment goal, but also improves their overall employability (Huang-Saad et al., 2018).

EE is a challenge to higher education institutions because of the permanent need to be updated, the need to measure students’ learning outcomes and the need to break down silos between disciplines in order to allow innovation to grow at the intersections of knowledge areas (Davey et al., 2016).

The promotion of entrepreneurship requires formal education and experiential learning. HEIs typically concentrate on the delivery of the theory, but are gradually introducing experimental learning to be able to give students the feel of real-life problems (Nakagawa et al., 2017).

Another big challenge that EE faces is the absence of a commonly accepted taxonomy. If existing, it could allow for a more effective comparison between programs and their outcomes. Indeed, there is a big diversity in terms of EE program contents and teaching methods



(Sirelkhatim & Gangi, 2015), and the rising demand is not necessarily supported by a sufficiently sized and qualified faculty (Pittaway, 2007). The starting point for promoting entrepreneurship competencies is to train lecturers in those skills, and that is why participating teachers follow specific training in order to become coaches (Pardo-Garcia et al., 2020).

The entrepreneurship education programs at the HEIs can have different contents: some focus on teaching how to start a company, others reinforce the process of identifying opportunities, while some invest in teaching the competencies that are associated with entrepreneurial thinking and acting (Rossano et al., 2016).

Studying entrepreneurs has been one of the starting points to design EE programs, especially the quest for the required entrepreneurial competencies, and how to gain them. Opportunity recognition and assessment, creative problem solving, the use of networks, risk management are a few examples of the skills highlighted by these programs (Sirelkhatim & Gangi, 2015). Entrepreneurs tend to carry out a broader span of tasks than people employed by a third party, and research shows that the skill variety acquired in the work environment is a good predictor of future leadership roles and in particular of self-employment (Krieger et al., 2018).

In most Portuguese universities entrepreneurship education focuses on business projects development rather than on developing entrepreneurial competencies (Farhangmehr et al., 2016).

The typical entrepreneurship process is a 3-step process: opportunity recognition, concept development and opportunity exploitation (Davey et al., 2016). So, entrepreneurial competencies include leadership, the ability to identify opportunities, creativity, analytical skills, negotiation, communication, problem-solving, adaptability, critical thinking, networking ability, teamwork building, among many others (Farhangmehr et al., 2016). While the literature shows an open debate as to whether opportunities are discovered or created, research shows that there is lack of training in terms of opportunity recognition. Such a step is crucial for all remaining business launch initiatives (Carpenter & Wilson, 2021).

Generally speaking, there are three big types of EE methodology: 1) the theory-oriented courses that teach about entrepreneurship which are mostly teacher-centered. The learner is rather passive and the most common teaching methods are lectures, case studies and guest speakers. Their biggest objective is to create awareness about entrepreneurship; 2) the practically-oriented courses teaching “for entrepreneurship”, where the students “pretend” to

be entrepreneurs. These courses are based on teaching skills on how to detect, assess and start a new business whereby the method of “learning by doing” is reinforced; 3) courses where the students are taught how to become entrepreneurs by immersing into real business life, collaborating in live projects with business people, doing internships, pitching ideas, etc. (Sirelkhatim & Gangi, 2015). This last teaching method implies that HEIs will need to put in place partnerships with businesses in order to better equip their students (Artess et al., 2017).

Active learning has been one of the most used educational methods in EE, using different tools such as scenarios, role playing, real business experiences, case study discussions, etc. (Sirelkhatim & Gangi, 2015).

EE does provide entrepreneurial attitudes and skills to students (Carpenter & Wilson, 2021), and specifically through learning by doing (Pardo-Garcia & Barac, 2020), but there is no straightforward conclusion that EE increases entrepreneurial action (Pittaway, 2007, Farhangmehr et al., 2016, Carpenter & Wilson, 2021).

Indeed, some studies have demonstrated that entrepreneurial intention precedes entrepreneurial behavior. Entrepreneurial self-efficacy, which is the person’s belief of her/his entrepreneurship skills, has been found to impact entrepreneurial intention (Maresch et al., 2015). But research has also given evidence to other factors that influence the entrepreneurial drive e.g. macro-economic factors, personality traits, perceived barriers/support in the specific business context, business knowledge mastery, gender, family experience of entrepreneurship, educational level and even age (Pittaway, 2007). Studies also show that national cultural differences, ranging from the USA individual entrepreneurship to the collective mindset of the Nordic European countries, impact entrepreneurship spirit (Ranga & Etzkowitz, 2013).

EE researchers often measure intended, and not actual, behaviors (Huang-Saad et al., 2018) i.e. a high proportion of EE learning outcomes are subjective and self-assessed, therefore needing to be interpreted in light of their methodological limitations. Such subjectivity restricts the possibility to claim objective economic and social impacts, resulting in a poor dissemination of effective pedagogies in EE (Carpenter & Wilson, 2021).

### Employability

Studies report an increasing geographic concentration of employment growth. 48 cities, with the highest GDP per capita in Europe, including megacities as London and Paris, and superstar

hubs as Munich, Amsterdam and Madrid, account for 20% of Europe's population but are responsible for 43% of Europe's GDP growth, 35% of its net job growth and 40% of its population growth between 2007 and 2018. Another reported trend points to the increasing presence of automation in the workplace, implying shrinking labor supply. It is estimated that 21 million workers may need to change jobs by 2030, and around 94 million workers may need retraining because of technology performing 20% of their current activities (McKinsey & Company, 2020). The Fourth Industrial Revolution, driven by technology, demands adaptability. In fact, according to the World Economic Forum January 2016 Report, the most in-demand occupations did not exist in the recent past and the pace of change is expected to accelerate (Epure & Vasilescu, 2016).

In December 2021, more than 2.7 million young persons (under 25) were unemployed in the EU, leading to a youth unemployment rate of 14.9 %, more than double of the overall EU unemployment rate of 6.4 % (Eurostat, 2022), both naturally impacted by the COVID crisis. This unused labor capacity has important social and economic impacts: on a micro-level it represents loss of income for the individuals and their eventual poverty and exclusion; on a national level youth unemployment puts pressure on governmental budgets because of higher spending on social benefits and lower tax revenues; on a global level it threatens EU market cohesion, its sustainability and growth. In this context the EU has been launching several initiatives to improve the labor market integration. In May 2018 the EU Council adopted a Recommendation on Key Competences for Lifelong Learning (European Commission, 2018) aiming at personal fulfilment and development, employability, social inclusion and active citizenship. This framework identifies eight key competencies, defined by a combination of knowledge, skills and attitudes: 1) Literacy, 2) Multilingualism, 3) Numerical, Scientific and Engineering skills, 4) Digital and technology-based competences, 5) Personal and social skills, and the ability to adopt new competences, 6) Active citizenship, 7) Entrepreneurship, and 8) Cultural awareness and expression. Last December the European Commission launched the European Action Plan *Building an economy that works for people: an action plan for the social economy* (2021-2030) (European Commission, 2021) , with the objective of integrating the social economy into several EU socio-economic policies, with business support, skills and youth entrepreneurship as some of the stated intervention areas.

Government policies across Europe are focusing on employability over life. Digitalization is not only eliminating human workforce, but also constantly changing the requirements of the existing one. HEI's mission should be equipping graduate students with initial employability

skills and also promote in them a culture of lifelong learning (Kornelakis & Petrakaki, 2020). Governments have been investing in education because they see it as a tool to fight unemployment, but in fact they also need to invest in policies that promote self-employment (Pardo-Garcia & Barac, 2020). The European Commission considers as a priority the employability and the promotion of entrepreneurial behavior (Plewa et al, 2015).

There is not a universally accepted definition of employability (Kornelakis & Petrakaki, 2020). The definition of employability is not easy, in the sense that the required skills and personal characteristics will most likely vary along the career life cycle (Ishengoma & Vaaland, 2016).

Employability can be defined as:

“A set of achievements – skills, understandings and personal attributes – that make individuals more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy.” (Yorke & Knight, 2006, p.8)

This definition makes clear that employment and employability are different concepts, and therefore promoting employability skills does not necessarily imply higher employment rates. Employment also depends on other factors such as the macroeconomic scenario (Kornelakis & Petrakaki, 2020).

The concept of “sustainable employability” is the capacity of being employable throughout one’s professional life (Pardo-Garcia & Barac, 2020). So, employability should not be defined upon the outcomes demanded by the labor market, but rather be seen as an individual capacity to be adaptable to the necessary changes along the professional path. The career flow has changed dramatically in the last decades, moving from the classic lifetime job scenario to a non-plannable progression marked by sectorial and organizational diversity. Research also suggests that career preparation, namely exploring and planning one’s career, helps to develop a multi-scenario strategy towards labor market integration. This means that apart from becoming employable, there is also the need to develop career management skills as the labor market is becoming more complex (Artess et al., 2017).

The debate regarding the role of higher education within society runs between two opposing poles: those who defend that higher education should be a pursuit of knowledge for its own sake, and those who see higher education as an education, research and development engine for

the country. For the latter, employability should be key in the HEI agendas, because it relates not only to employment rates, salaries and tax revenues, but also to more profound issues of personal effectiveness and citizenship, making them politically relevant (Artess et al., 2017). Growing competition in the education sector is also pushing HEIs to look at the employability of their students (Kornelakis & Petrakaki, 2020), and sometimes employability is seen as an indicator of educational quality (Ishengoma & Vaaland, 2016).

In recent times there have been rapid social changes that happen within a generation. These intergenerational changes do not allow one generation to prepare itself adequately to train the following one (Enguita, 2007). This phenomenon is posing big challenges to HEIs.

HEIs have been pushed to demonstrate the relevance of their program contents by having graduate employability as a major goal (Pavlin, 2016). This implies that HEIs choose different employability promotion strategies, namely maximizing the correspondence between the curriculum learning goals and employability outcomes; facilitating co-curricular and extra-curricular activities that complement the theoretical knowledge; creating networks with the labor market (both at the institutional and student levels) and supporting students in doing the same; and increasing students' self-reflection, self-confidence and ability to communicate their knowledge to potential employers. These efforts can be done by all HEIs at a country level, at a HEI group level or by a single HEI (Artess et al., 2017).

There is extensive discussion regarding factors that promote employability. Some of these factors relate to what students should know (knowledge), some to what they can do (skills), and others to who they are (personal characteristics). Because there is a widespread of concepts related to employability such as knowledge, skills and competences, a possible way out is to refer to all these as "attributes". Based upon extensive research, the following graduate attributes, listed by alphabetical order, were found to be relevant in terms of employability (at a personal level and in citizenship terms): Aspiration, Autonomy, Career management, Communication skills, Creativity, Critical thinking skills, Customer awareness, Digital literacy, Efficiency, Emotional intelligence, Enterprise and entrepreneurship, Ethics, Flexibility and adaptability, Giving and receiving feedback, Independent thinking, Initiative and self-direction, Interpersonal skills, Language skills (particularly second language skills), Multi-tasking, Numeracy, Opportunity awareness, Positive attitude, Presentation skills, Problem solving, Professional knowledge, Research skills, Resilience, Self-management, Social intelligence, Team-working, Time management, Willingness (and capability) to learn, Work ethic and

Writing skills. Additionally, three personal attributes are also key: “personal literacy” (which is the capacity of the student to be self-aware of his/her attributes, understand how these attributes are relevant for the potential employer and be able to demonstrate the match), self-confidence (which is needed to mobilize non-technical skills into the workplace) and self-control (which leads to self-efficacy, inducing successful job-seeking behaviors) (Artess et al., 2017).

Apart from these attributes, several studies suggest that all types of UBC initiatives impact positively, directly or indirectly, on student employability and especially when involving the student directly (Ishengoma & Vaaland, 2016; Rampersad, 2015). The acquisition of relevant work experience, both formal and informal, short-term or long-term, during their studies facilitate the students’ integration into the labor market. Studies show that different types of extracurricular activities impact different employability attributes (Artess et al., 2017). Skills such as communication, research, option-analysis, decision making, creativity, or problem-solving, together with attitudes such as proactiveness, team-player and adaptability are seen as important for maximizing employability. And many students aim to acquire those skills through extra-curricular activities (Pardo-Garcia & Barac, 2020). The medium-large business actors definitely have a very important role in promoting UBC, but research shows the importance of also engaging small-and-medium sized companies (SME’s) as they represent a large proportion of the economy (Ishengoma & Vaaland, 2016). In 2020 EU 27 countries had around 22,5 Million SME’s, 99,8% of total enterprises, employing 65% of total employees and being responsible for 53% of the total value added (Orazbayeva et al., 2019). In Portugal SME’s employ 76,2% of the population, their productivity (calculated as value added per person employed) is around half the EU average, and many have been highly impacted by the COVID-19 pandemic (Portugal SME Fact Sheet, 2021).

Research shows that motivation and relevance play a major role in the work experience impact, namely voluntary work experience (opposite to mandatory) and closeness to the field of study increase the benefits taken by students (Artess et al., 2017).

Research shows that higher education is not capable of preparing graduates for their future jobs and one of the reasons is the time gap that lies between the identification of new job requirements and the effective training response (Quintana et al., 2016). Student learning profiles are also constantly changing because of the impact of new technologies (Epure, 2017). Employers require skills, not all observable, which are transferable to different work

environments and job contents (Pardo-Garcia & Barac, 2020). There is an overall satisfaction regarding graduates' basic skills (literacy, numeracy and IT), but they lack complex skills (Artess et al., 2017; Kornelakis & Petrakaki, 2020). Research shows that apart from specific sector related competencies, there are certain missing universal skills and attitudes including, but not limited to, communication skills, team-work, problem-solving, initiative and leadership. One competency that is highest in demand by the employers is the capacity to innovate, which implies recognition of new opportunities, leadership to mobilize others, and the creation of new ideas (Quintana et al., 2016).

### Problem-based Learning

Skills tend to be defined as the “observable” application of knowledge (Krieger et al., 2018).

Today's labor market demands varied skills e.g. learning capacity and innovation (including critical thinking, creativity, collaboration and communication) which are not provided by current educational systems and which are difficult to evaluate using traditional assessment practices (Qian et al., 2016) given that they are typically neither observable nor measurable (Keinanen & Butter., 2018).

Research shows that innovation competences require learning by doing, on top of theoretical knowledge (Keinanen & Butter, 2018).

Teachers at HEIs are typically trained to disseminate specific knowledge related to a specific curriculum, but not necessarily focused on non-cognitive skills (Quintana et al. 2016).

There are various student learning experiences that can promote employability skills: from self-study, lectures, career related workshops or participation in work-integrated learning experiences (Kornelakis & Petrakaki, 2020).

Research points to three training models related to university: 1) the traditional universities where the academic theories are linked with “simulated practice”; 2) the participation of business owners/managers in the classes in order to solve real business problems; 3) developing the business practice in *separate institutions* that are close to the university. The first model has been heavily criticized for not allowing students to be sufficiently equipped to cope with the current labor market demands (Ishengoma & Vaaland, 2016).

Barrows & Tamblyn (1980, p.1) define Problem-based Learning (PBL) as:

“the learning that results from the process of working towards the understanding of a resolution of a problem.” meaning that the best learning experience is the one where the students build the solutions.

Problem-based learning can take various formats, and one of them is the “living case study”. In this format students are confronted with a real-life organizational problem and they are invited to reflect upon it and present their analysis to the people that indeed are trying to solve that problem. This method also helps students to develop business and customer awareness. The debate within the group also promotes critical thinking together with communication skills and respect for others’ points of view (Kornelakis & Petrakaki, 2020).

Live projects are hybrid learning methods lying between on-the-job training and academic teaching. Related research has shown positive impacts on students in terms of their research leadership, problem solving, communication, teamwork, presentation skills and self-confidence. Teamwork is associated with other skills such as time management, negotiation, strategic thinking, and persuasion (Chang, 2013). Research has also concluded that learning in a real-life scenario impacts positively the integration into the labor market, especially for students with lower educational achievement. Live projects are also especially relevant in preparing for entry-level jobs because they allow to train competencies that otherwise could never be shown in a student’s resume for lack of previous work experience (Artes et al., 2017).

The active students’ participation, who learn by doing, implies moving from teacher-driven education to student-centered learning, turning teachers into facilitators rather than instructors (Rossano et al., 2016). Apart from teaching content, teaching styles are also important to promote the development of competencies that the labor market requires from students (Quintana et al., 2016).

Effective learning needs to be situational, active and problem-based to have immediate feedback tools. This form of learning also requires the learner’s investment in terms of time and effort. Modern pedagogy includes dimensions of “learning by being told”, “learning by doing/through role play”, and ultimately “learning by becoming” (Qian et al., 2016).

Research shows that students involved in UBC-based PBL projects perceive the main benefit to be the practical experience in solving real-life problems (Rossano et al., 2016). It also shows that they are motivated by the acquisition of transversal skills e.g. teamwork,



collaboration in multicultural groups, creativity and entrepreneurial behavior, that will be required throughout their professional careers (Rossano et al., 2016; Quintana et al., 2016). The social interaction in PBL also contributes to the learning experience because students learn with their peers, their teachers and, overall, with the socio-economic environment in which they are embedded (Rossano et al., 2016).

For the business organizations, live projects deliver new insights into real-life problems, but also represent an access to a recruiting pool. As far as academic staff is concerned, these projects provide access to companies, allowing academics to understand the real business problems industry is facing. Teachers are also exposed to lack of (specific business) knowledge, unstructured information, time pressure and the challenge of switching from a leadership role to a facilitator position (Chang, 2013).

PBL projects are nevertheless challenging in various ways like for example too broad problem definition or difficulty in finding information that can support the decision-making (Rossano et al., 2016).

Indeed, the complementarity between conventional HEI education and the experiential approach are key as the former focuses on problems and the latter on solutions (Nakagawa et al., 2017).

### 3. Research Methodology

Research reveals the lack of UBC value evaluation and insufficient communication about that value when determined. Therefore, this study's research objective is to give evidence on the value of a particular UBC activity, *Demola*, to its stakeholders. The value is captured from multiple perspectives, i.e. each stakeholder's perceived benefits. An additional goal is to understand how that value could be communicated, impacting the awareness and credibility of this UBC tool.

*Demola* was implemented in all Polytechnic schools in Portugal, but only one school, namely *Instituto Politécnico de Setúbal (IPS)* was studied because of its geographical proximity and time constraints. The research covered *Demola* implementation at *IPS* during the first semester of 2021/2022 involving 5 teams with a total of 10 teachers, 20 students and 5 Companies/institutions.

All the involved stakeholders were personally invited to participate in this research, and the majority accepted, except for the Governmental representative.

Because the population and sample size were small and it is complex to evaluate the benefits of this learning experience, a qualitative approach was chosen. The research technique that was used allowed for primary data collection through semi-structured interviews (Appendix A) to the stakeholders involved, namely institutional representatives from both *Demola* and *IPS*, and the participating students, teachers, and companies.

Because of the pandemic scenario, and to give most convenience to the respondents, the interviews were done through videoconference via Zoom.

Participants' anonymity was assured to avoid any institutional conforming bias.

A qualitative validation of the interview grid was performed beforehand: this was done by inquiring students, teachers and company representatives, all not involved in the study, regarding its clarity. This panel validated the overall interview grid, but some suggestions were made (e.g. reducing the ranking options to top 3) and were integrated in the final version.

The interview was split into five main parts: a) characterization of the respondents; b) their previous UBC experience and associated motivations; c) their perception of *Demola's* benefits for the different stakeholders; d) their perceptions of the attributes that most promote employability and which of these are improved by *Demola* participation; and e) gather information / suggestions about *Demola's* value communication.

The *IPS* and the *Demola* representatives were interviewed once before the project began.

Students, teachers and company representatives were interviewed in two moments: before the *Demola* implementation started and after it ended, in order to try to measure the changes.

#### a) Characterization of the Respondents

In terms of the respondents' characterization, they were first classified according to their stakeholder type: Student, Teacher, Company, *Demola* representative or *IPS* representative.

Students were also inquired in terms of name (only for the sake of being able to match the responses before and after project implementation), gender, age, nationality, area of studies, level of studies and if they were a working student.

Teachers were inquired in terms of name (only for the sake of being able to match the responses before and after project implementation), gender, age, area of studies, number of years working as a teacher and number of years working in other professions.

Companies' representatives were inquired in terms company's name, sector of activity, their personal name (only for the sake of being able to match the responses before and after project implementation), their role within the company, and whether they were IPS alumni.

*IPS*' and *Demola*'s representatives were inquired in terms of their role within their organizations.

b) Respondent's UBC previous experience and associated motivations

The respondents were asked whether they had any previous UBC experience and which. It was also requested to confirm if they had any previous experience with *Demola*. In general, they were asked to describe which were their main motivations to enroll in UBC.

c) Perception of *Demola*'s benefits for the different stakeholders

Students, teachers and company representatives were asked to describe their personal benefits from participating in this *Demola* project, but also to evaluate the perceived benefits for the remaining stakeholders. This exercise was used not only to give the possibility to all participants to reflect upon the overall value of the project, but also to identify whether the different stakeholders' goals are aligned, which is a condition for the project success as a whole.

This inquiry was made before the project started and after it ended.

To categorize the answers more efficiently, an answer scheme was created based on the literature review.

d) Attributes that promote employability

The respondents were asked to reflect upon the attributes that maximize employability. Using the list proposed by Artess et al. (2017), respondents were asked to indicate the 10 attributes that most improve graduates' employability, and within these, rank the top 3 (1 being the most important one). Afterwards, and reflecting upon their *Demola* participation, they were asked to identify from the list which were the 10 main attributes that *Demola* helped to promote including the top 3.

e) *Demola's* evaluation and communication

*Demola* Global and IPS representatives were required to share the tools they use for evaluating *Demola*.

At the end of the implementation of the *Demola* project, participating students, teachers and companies' representatives were asked to give suggestions on how the communication about *Demola's* benefits could be enhanced.

#### 4. Data Analysis

The sample consisted of one *Demola* institutional representative, one *IPS* institutional representative, seven participating teachers, seven participating students and two company representatives.

#### *Demola*

The *Demola* institutional representative that was interviewed is a Partner at *Demola* Global who accompanies the implementation of *Demola* in various countries. Based upon his interview and several studies now follows a description of the *Demola* concept, its origin and its implementation at IPS.

Denmark, Finland and Sweden are the countries with both the highest education index and the highest GDP per capita, demonstrating the importance of knowledge and education on economic growth (Glodowska, 2017).

Since the 1990's, Finland has become an innovation-driven economy with a strong national coordination of research, education and innovation. Over the last decade, this small open economy has invested in knowledge transfer through continuous reforms, mainly led by both the Ministry of Education and Culture and the Ministry of Economic Affairs and Employment. Among other reforms, the University Inventions Act (2007) granted universities with rights related to inventions, state research units were consolidated into larger units, and the government enhanced the coordination of research through a revised funding policy for universities to align their funding with governmental goals. As a result, there has been a shift from "big company-focused policy towards more innovation-driven, start-up-focused policy" (Halme et al., 2019) and an increase in Public-Private Partnerships initiatives. In Finland a higher share of structural funds (when compared to the EU average) has been devoted to

technology transfer and university-business cooperation. Besides the central R&D&I governance, regional autonomy has been reinforced in order to promote regional growth ecosystems. Also, universities have become independent legal entities that determine their focus. The commercialization of research outcomes has become a priority for Finland, in particular at the international level (Halme et al., 2019). In Finland, universities are perceived as important national and regional development engines, through innovation and entrepreneurship. In this country, UBC has been led traditionally by technical universities, although in more recent years it has also been adopted by more generalist ones (Ranga et al., 2016).

*Demola*, which means “places where demos are done” is an awarded collaborative innovation platform for universities, companies and students. It was born in 2008 in Tampere University, Finland, in the context of the local economic development program “Creative Tampere 2006-2011” as a co-creation initiative led by Nokia (Einarson & Lundblad, 2014). Co-creation can be defined as the process by which stakeholders and organizations jointly create value. Research suggests that co-creation depends upon the existence of common goals for the different stakeholders (Loureiro et al., 2020). Co-creation helps companies to gain competitive advantage through innovation, and also impacts positively customer satisfaction and loyalty (Voorberg et al., 2014).

In 2011 *Demola* started to expand internationally, becoming known as *Demola Global*. Recently, *Demola Global* has been establishing bigger nodes in geographic terms, with Portugal being an example of a national node (Catalá-Perez et al., 2020). *Demola*’s headquarters have stopped doing single company projects and are now focusing on linking *Demola* with internationally themed research projects (e.g. food trends) in order to increase its relevance and awareness. In Finland, *Demola* is providing entrepreneurial skills training for highly educated unemployed people and some pilots are already starting in other countries. *Demola* wants to be perceived as a personal development program, where the most important objective is not finding solutions for each problem, but rather the value created by the learning experience such as the creation of collaborative networks. Currently, *Demola Global* is present in 18 countries, engages with over 50 HEI institutions and has an impact on 750.000 students (*Demola Global*, 2022).

*Demola* is a temporary and risk-free learning environment using a standard entrepreneurial driven methodology. *Demola Global* is responsible for the supply of Facilitators’ training, tools, processes and the complete legal framework, including the intellectual rights property

management. Teams of multidisciplinary and multicultural students, coached by a facilitator, are brought together to solve real-life business challenges contributing with their academic mindset and unbiased viewpoints, under the protection of contracts that safeguard intellectual property.

*Demola* projects typically last from 8 to 12 weeks. The participation is voluntary, the contents are delivered in English and include academic credit recognition (6 ECTS per semester at *IPS*). *Demola*'s methodology includes three steps namely a) Discovery, b) Ideation and Prototyping and c) Refine and Package.

*Demola*'s pre-requisites in terms of participation are very important to select the type of people that favor novelty and challenge (Fernandez, 2020). For example, at *IPS* there was a dissemination phase of the project and a recruitment of teachers, called Facilitators, before the semester started. One *Demola* project typically requires two teachers who are trained by *Demola Global*, throughout the 8 weeks to become Facilitators and implement the *Demola* model. Therefore, *Demola* also becomes a learning experience for the teachers.

Once the Facilitators are selected, they are responsible for selecting the participating students based upon their application. Special attention is given to the students' motivation towards the program, but also to their course of study, nationality and gender, in order to ensure multidisciplinary, multicultural and gender balance. Ranga & Etzkowitz (2013) defend that cross-fertilization allows for better results that could not have happened individually. Nakagawa et al. (2017) propose that the heterogeneity of participants allows not only for richer knowledge collection but specially for the integration of different knowledge areas.

The Facilitators are also responsible for recruiting the participating companies, called the Challengers. Together they define a business problem that fits into the 8-week timeframe of the *Demola* course. The management of expectations regarding all involved stakeholders is very important because everyone needs to be prepared for the fact that there may not be a direct solution to the challenge, or that the response which is found may be unexpected. This is particularly valid for the Facilitators who have been trained throughout their whole professional life to always have an answer. Sometimes more important than a concrete answer, the innovation may lie in a clue for a future market trend. After the group formation, the Challenger representative gives a brief presentation of the company and presents its business problem to the students and Facilitator. Sometimes there is a visit to the sponsoring company, which is highly beneficial, because students get to better understand how the company delivers the

product / service. Under *Demola Global's* supervision, each project group performs weekly tasks, following an entrepreneurial path. The teams also deliver weekly reports as part of their official assessment in order to monitor and discuss progress towards the business challenge. Facilitators and Challengers are not supposed to contribute with ideas towards the solution, but rather are expected to support the process to achieve the best outcome. They should only intervene and offer advice when the students' team gets stuck.

Relational governance, which is the informal interaction and communication between partners, impacts knowledge sharing and shows the need for regular and effective communication (Clauss & Kesting, 2017).

Upon the completion of the project, final group reports and a team presentation are required, along with evaluation reports by students, facilitators and *Demola* representatives. *Demola Global* provides the following evaluation tools: a) a 360° self-evaluation questionnaire applied to students before and after each project, containing the following metrics: Optimism, Creativity, Curiosity, Teamwork and Empathy; b) peer evaluations among students; c) evaluation of the Facilitator by the students; and d) evaluation of the students by the Facilitator.

Since *Demola* is being financed in Portugal by governmental funds, *IPS* is required to send a report to the funding program. This report includes the results of questionnaires applied to the Facilitators regarding their perceived benefits in participating in *Demola*.

Student presentations are a learning method that promotes several employability skills, including oral communication and IT skills. If done in a group, it also requires teamwork and self-management skills (Kornelakis & Petrakaki, 2020).

Time management is critical because of the 8-week duration and the required timetable management of Facilitators and students from different areas of study and study levels.

*Demola* provides diversified benefits for the different stakeholders. For students, it provides a real-life work experience in a multidisciplinary and international environment, it promotes their self-knowledge and helps them to develop some transversal skills that enhance employability. Additionally, it trains students in terms of innovation, it provides professional contacts, academic recognition and eventual revenue from licensed results. For HEIs, *Demola* presents an opportunity to develop new teaching approaches and to gain contacts within the industry. For companies, *Demola* provides access to new knowledge and insights, new talent recruitment opportunities and university contacts for future cooperation (Catalá-Perez et.al, 2020).

*Demola* has become reality because of individual people believing in the project. Specifically, HEIs have been the engine bringing *Demola* into the education system. The involvement of key organizations determines the program's credibility. The existing difficulty of *Demola* is in accessing and/or convincing large companies' decision makers. Younger generations of company decision makers may be more open to the *Demola* model (Catalá-Perez et.al, 2020).

*Demola* has significant potential because it is a highly transferable experience, ranging from the type of challenges it offers to the multidisciplinary of students and teachers. However, the country's innovation culture is decisive in capturing its value. While *Demola* got boosted by Nokia in Finland, *Demola* has been struggling to engage with big companies in Spain (Catalá-Perez et al., 2020).

### *Instituto Politécnico de Setúbal*

The *IPS* institutional representative that was interviewed is the *Demola* Co-coordinator at *IPS*. He had already participated in the *Demola* project as a facilitator the previous semester. His educational background is IT and he has been teaching over the last 30 years. Based upon his interview and *IPS*' institutional information (*IPS*, 2022) now follows a description of this polytechnic school and how it was originally exposed to *Demola*.

*Instituto Politécnico de Setúbal (IPS)* is a Portuguese public higher education institution, operating since 1981, located in the Setúbal district. Being a Polytechnic School, it promotes professional knowledge, alongside scientific knowledge, to be used in the service of the local community. It includes five higher education schools spread over two cities/campuses, namely *Escola Superior de Tecnologia de Setúbal* (technological school), *Escola Superior de Ciências Empresariais* (management school), *Escola Superior de Tecnologia do Barreiro* (technological school), *Escola Superior de Saúde* (health sciences school) and *Escola Superior de Educação* (educational school), all coordinated by *IPS*' central offices. *IPS*' educational offer comprises more than 85 courses (professional courses, undergraduate courses, master courses and post-graduation courses). Besides education, this polytechnic school invests in research and provides services, both at the national and international level. In 2020, *IPS* was the home of more than 630 teachers and 7000 students (*IPS*, 2021).



In the context of Europe 2020, EU's 2010-2020 strategy to revitalize the economy after the 2008 economic-financial crisis, *Demola* at *IPS* is being financed by *Programa Operacional Capital Humano* (POCH or Operational Human Capital Program), a governmental program which aims for Quality and Innovation in the educational /training systems. The main training areas have been project facilitation, communication in general (specifically in interdisciplinary spaces) and digital literacy.

In 2017 Bragança Polytechnic School tried implementing *Demola* for the 1<sup>st</sup> time. *IPS* President Pedro Dominginhos, who became President of the national council of the Portuguese Polytechnic schools in 2018, was exposed to *Demola*'s benefits and decided to push for a nationwide implementation of *Demola*. As a consequence, all Portuguese polytechnic schools submitted projects to the POCH program in order to finance *Demola* implementation. *IPS* submitted project POCH-04-5267-FSE-000819, worth 178.000€ (85% financed by EU funds), that was approved in July 2020. The project started in January 2021 and will end in August 2023. The first *Demola* projects at *IPS* took place in the second semester of 2020/2021 and this study covers the *Demola* projects that took place in the first semester 2021/2022 (*IPS*, 2022).

### Teachers' sample

Some of the teachers' sample characteristics are the result of *Demola*'s pre-requisites, namely diverse education background (different areas of Engineering, Accounting, Nursing, Biology and Communication). The seven inquired teachers were all Portuguese, mostly female (5), aged 47 to 59 and with a professional career mostly dedicated to teaching and research. The majority of them (4) had already been involved in previous UBC activities, namely in providing services to companies (e.g. training, audits or consultancy), but they were all participating in *Demola* for the 1<sup>st</sup> time.

### Students' sample

Some of the students' sample characteristics are again the result of *Demola*'s intended pre-requisites, namely multiculturality and diverse education background/study level. The students' sample was multicultural (there were four different nationalities among the seven inquired students). Although gender balance was also a project goal, most of the students were male (5), aged 19 to 43, originating from different education backgrounds (various Engineering fields,

Neuroscience, Biochemistry and Physiotherapy). Most of them (4) were studying at an undergraduate level, but others (3) at a masters' level. There was a high proportion (3) of working students in line with the polytechnic school context. Most of them (5) had never been previously involved in UBC activities. The two students that had been involved in the past in UBC, were in fact repeating their participation in *Demola*.

### Companies' sample

Only three participating companies agreed to take part in this study: a cement plant, a regional governmental energy agency, and a rural enterprise. They all had been invited to participate by an *IPS* teacher, had managerial responsibilities and one of the companies' representatives was an *IPS* alumni.

### UBC – Previous Experiences and Motivations

Apart from the two students that were repeating the *Demola* experience, the remaining participating students had never been involved in a UBC initiative. The main motivations referred by students to participate in *Demola* were: CV improvement, getting to know other areas of knowledge, academic credits, teacher invitation, gaining practical experience, prototyping, developing creativity and the Challenger characteristics (company / challenge). Because some companies operated in the region, a sense of joint interests' defense was mentioned.

From the seven participating teachers, the majority (4) had already participated in UBC initiatives, namely through *IPS* continuous engagement with businesses. The motivations they expressed to participate in *Demola* were the following: creating links to the business world, updating pedagogical methods, expanding internal and external network, learning new skills (entrepreneurship included), interest in co-creation, sustainability, and circular economy.

*IPS* has been engaging in UBC related initiatives since its origin, being the “Bright Star” project one of the most significant ones, which results from a partnership with Deloitte with the main objective to support students with economic difficulties. *IPS*' motivation to participate in *Demola* is to equip teachers with innovative pedagogical tools that can be used at teaching and business-related initiatives.

*Demola Global*, which is a profit-oriented organization, is implementing its largest international training ever in Portugal with government support. This training is expected to turn 900 teachers into UBC facilitators.

### Benefits for the Teachers (Appendix B)

Most of the inquired teachers refer that *Demola's* participation has been beneficial in terms of gaining entrepreneurship skills, gaining/training soft skills and updating their teaching methods.

Most of the inquired students believe that the teachers benefit by participating in *Demola* projects through updating teaching contents and methods, and gaining new knowledge (technical and in a specific sector/product).

Most of the inquired company representatives perceive *Demola* to benefit teachers in terms of company network enlargement, the gain of knowledge in a specific sector/product and the possibility to update their teaching methods.

Other teachers' benefits that were mentioned by the different respondents include dealing with uncertainty, communication, mediation, digital literacy, empathy, teamwork, resilience, gaining knowledge about other cultures, and expanding their internal network inside *IPS*.

In summary, most of the involved shareholders perceive *Demola* to contribute towards teachers updating their teaching methods.

### Benefits for the Students (Appendix B)

Most of the inquired students refer that the *Demola* participation has been mainly beneficial for them in terms of gaining new knowledge (technical and in a different area of study), acquiring/training soft skills, gaining multicultural experience, learning entrepreneurship skills, and having a chance of being socially responsible.

Most of the inquired teachers believe that the students benefit by participating in *Demola* through gaining entrepreneurship skills, acquiring knowledge in different areas of study, having an opportunity to be socially responsible, and developing/training soft skills.

All company representatives perceive that *Demola* benefits students in terms of gaining knowledge in a different area of study and acquiring/soft skills. Other perceived benefits by

most of the companies are gaining entrepreneurship skills, expanding the recruitment network, acquiring knowledge in a specific sector, and being able to be socially responsible (dependent upon each *Demola* project challenge).

Other students' benefits that were mentioned by the different respondents were self-challenge, handling different opinions, teamwork, digital literacy, communication, leadership, presentation skills, learning how companies work from the inside including their decision-making process, organization, dialogue, creativity, problem-solving, promoting the students' individuality, making friends, learning how to integrate a company, expanding networks, and understanding about intellectual property.

In summary, most of the involved shareholders perceive *Demola* to contribute towards students gaining/training soft skills and getting new knowledge in other areas of study.

#### Benefits for the Companies (Appendix B)

All inquired company representatives agree that the main *Demola* benefits are the challenge response and the community recognition. Most of them also see positive contributions in terms of HEI relationship promotion and the response to corporate responsibility goals.

In terms of *Demola*'s benefits for the companies, the inquired teachers refer the immediate response to the proposed challenges, the possibility to build or reinforce a relationship with a HEI that could be a source of future partnership, and the possibility of responding to corporate responsibility goals.

Most of the inquired students regard the companies' benefits in participating in *Demola* to be the response to the proposed challenges, the promotion of the relationship with the HEI and the response to corporate responsibility goals.

Other companies' benefits that were mentioned by the different respondents were the gain of new perspectives of the problems, and the access to different working methods and different cultures.

In summary, most of the involved shareholders perceive *Demola* to contribute towards companies getting immediate responses to their business challenges and promoting HEI relationships.

## Employability (Appendix C)

4 out of the 7 inquired teachers believe that the labor market particularly values the following attributes: autonomy, communication skills, creativity, critical thinking, emotional intelligence, flexibility/adaptability and foreign language skills. Out of these seven characteristics, they believe that the *Demola* project promotes most of them, namely autonomy, communication skills, creativity, critical thinking and flexibility/adaptability. Teachers also perceive *Demola* to promote independent thinking, research skills, team-working and time management.

4 out of the 7 inquired students believe that the labor market particularly values creativity, foreign language competences, problem-solving skills, professional knowledge and teamwork. Out of these five characteristics, they believe that *Demola* especially promotes creativity, problem-solving and teamwork. Students also perceive *Demola* to promote communication skills, critical thinking, entrepreneurship, interpersonal skills, opportunity awareness and willingness to learn.

Most of the company representatives believe that the labor market particularly values creativity, critical thinking skills, digital literacy, entrepreneurship, flexibility/adaptability, interpersonal skills, language skills, positive attitude, problem-solving skills, research capabilities and teamwork. Out of these eleven characteristics, they perceive that *Demola* especially promotes critical thinking, interpersonal skills, language skills and teamwork.

In summary, *Demola* is perceived to mostly promote critical thinking, language skills and teamwork, which are also seen as critical in the context of labor market integration.

## *Demola's* Communication

Considering all the feedback received from students, teachers and company representatives, the following suggestions, divided by target audience (students, companies and teachers), were given to communicate *Demola's* benefits:

- 1) Students: a) sharing online the challenges and corresponding responses in a 2 min pitch form; b) sharing online the testimonials of participating students referring to the benefits that were gained incl. ECTS; c) student-targeted webinars; and d) posters to be placed at *IPS* common areas.
- 2) Companies: a) sharing of previous editions' results in terms of challenge details and solutions, although care needs to be taken in regards to each company's sensitive data.

- 3) Teachers: a) project fair displaying the project challenge; b) sharing the participating teachers' testimonials; c) and a research article.

In summary, although there is some communication of the *Demola* results, there remains room for improvement as can be concluded from the respondents' suggestions.

The above data refers to the data collected before the start of the *Demola* implementation. All students, teachers and company representatives were contacted after *Demola* implementation and the ones that responded mentioned that their opinions did not change compared to their initial thoughts.

## 5. Discussion and Findings

The research question was to understand whether *Demola* delivered value at *IPS*, and indeed this study reveals that this HIC tool is impacting positively all involved stakeholders.

*Demola's* implementation at *IPS*, and even on a national basis, has been possible due to two main factors: a) the vision of an academically related person who had previous HIC experience and had been exposed to *Demola*; and b) Government financing. This reality is in line with the literature review that reveals the leadership role of the academic world pushing for HIC, the importance of experiencing HIC to become its supporter, and the role of Governments in the Triple Helix context.

*Demola's* implementation in all polytechnic schools in Portugal illustrates the importance of looking for integrated and well-coordinated HIC efforts, avoiding the typical inefficiencies and lack of economies of scale, as revealed by research.

*Demola's* methodology regarding participants' selection safeguards upfront that value potential exists. Being a voluntary experience, as suggested in several studies, participants' motivation is assured. The Facilitators are selected according to their innovation-driven motivation and are drawn from different areas of study. The students, that also need to show their innovation commitment, need to be gender balanced and come from multicultural and multidisciplinary contexts. This risk-free context allows for delivering solutions to increasingly complex problems that touch different knowledge areas and social realities.

As revealed by the perceived benefits mentioned by the different stakeholders, this study reveals that the involved parties' interests are aligned. According to research this alignment of interests helps to assure *Demola's* success.

Most of the Challengers (companies) that partner with *IPS* are local organizations. This enables students, many of them living or working in that region, to more easily relate to the real-life problems being presented, but above all take joint ownership in finding solutions. This is in line with literature that suggests the fact of HIC being adaptable to each unique context. This adaptability implies the potential for *Demola's* financing entities (e.g. Governments or economic regional clusters) to orient the challenge goals towards specific needs.

*Demola* is perceived to mostly promote critical thinking, language skills and teamwork, enabling a good labor market integration, in agreement with several studies, as seen in the literature review. These attributes indeed are not only important at the beginning of the professional life but are also critical in the context of sustainable employability throughout the whole career. There are similar initiatives to *Demola*, running worldwide, like the G-TEC program at Osaka University in Japan (Nakagawa et al., 2017) or the MOTIVEM program at the Universitat de Valencia in Spain (Pardo-Garcia & Barac, 2020), that are very powerful HIC tools contributing positively towards employability.

Additionally, *Demola* is perceived by many of the participants to teach entrepreneurship skills, which may support good professional performance, but also lead to self-employment, in line with the desired EU goals.

Although there is some communication about *Demola's* benefits, there seems to be room for improvement, as also found in the literature review. Effective communication about HIC benefits should be based on a commonly accepted HIC taxonomy as well as a "universal" evaluation framework. Taking into account the huge EU investments in HIC, we suggest that at least at an European level, these taxonomy and evaluation frameworks be defined and applied to all projects financed by the EU institutional organisms.

In summary, this study gives support to several HIC related aspects revealed in the literature, and shows that *Demola* is a powerful HIC tool that promotes employability in general, but also a better labor market integration of young graduates.

## 6. Conclusion

In recent times there have been rapid social changes that happen within a generation. These intergenerational changes do not allow one generation to prepare itself adequately to train the following one (Enguita, 2007). This phenomenon is posing big challenges to HEIs.

HIC can be a tool to help the education world keep updated and relevant. Even though this study's findings are not statistically significant, they reveal that *Demola* tool delivers value to all involved stakeholders and promotes employability, and in particular youth employability when used in HEI contexts.

By assessing and communicating *Demola*'s value this study aims to support HIC in general

## 7. Research Limitations

This study has generic limitations that come from the subjectivity of the choice of material (keywords, databases, language, etc.).

The first main limitation is the size of the sample which implies that this study's findings are not statistically valid. The survey was carried out in one country, one Polytechnic school, one semester, and covering a small number of students, teachers, and companies.

The second main limitation arises from being self-assessed benefits, also limiting the findings' generalization.

Other limitations are the lack of sufficient feedback from companies, which are critical stakeholders, and the absence of a governmental representative opinion. This is particularly relevant because the *Demola* experience at *IPS* has only been possible because of governmental financing.

Also, since the students' and teachers' participation in the survey was voluntary, the findings may not be representative of the overall participating group.

The research focused on the *Demola* implementation in a specific polytechnic school, located in a specific country/region, with its own economic and social setting, and having a particular profile of students, teachers, and companies. As an example, the percentage of working students in the study sample is a very specific context to *IPS* that does not represent many HEIs.



Regarding the inputs from *Demola* International, the *IPS* representative and the companies' representatives, although it was indicated that they should provide an institutional position on different topics, there can be an understandable tendency to provide their personal opinion.

The fact that all teachers, students, and company representatives replied at the end of the experience that their perceptions had not changed may mean lack of availability to respond, rather than being interpreted that they indeed did not alter their opinion throughout the whole experience.

From a practical implementation perspective, there are also aspects that may impact the study's findings. The list of attributes that promote employability was long, even though it was supported by literature review. This length made it difficult for respondents to select and rank. Finally, the interviews were made online, because of the COVID pandemic, and therefore the nuances of an in-person conversation, namely the body language that may give hints for additional questions, might not have been noted, resulting in poorer feedback.

## 8. Ideas for Future Research

Key future research areas are the identification of HIC taxonomy and evaluation frameworks. In particular, we identify *Demola's* main challenge as researching objective evaluation indicators that could further enhance this tool's educational credibility.

Another future research project could be the analysis of *Demola's* benefits using a representative sample of students, teachers and companies, including comparisons between countries.

It could also be researched in what way HIC tools like *Demola* contribute to supporting students with lower educational achievement, trying to understand if indeed they can be a social inclusion tool.

A final suggested research project could be the identification of how the HIC tools need to adapt to different educational contexts. Most of the literature refers to University-Business practice, whilst the Higher Education context is much more diverse. Typically, Universities are associated with a higher theoretical component than Polytechnic schools. This means that the HIC research should be enlarged to non-university learning environments, e.g. polytechnic schools and vocational training schools. Studying these non-university learning environments could be a solid platform for designing customized HIC tools that are better adapted to individual market labor needs.

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## Appendix A- Interview grid

### **Introduction**

Thank you for your time and allowing this interview. It will take no more than 1/2h hour.

Your input will be greatly beneficial for the research I am conducting about University-Business Cooperation, promoting youth employment and economic growth.

### **Questions to Students, Teachers and Company representatives**

Charaterization - (personal identification will not be used in the research)

Name:

Company Name / Sector of activity / Company Role/ Are you *IPS* Alumni?:**(only applied to companies)**

Sex:

Age:

Nationality:

Area of Studies:

Current Year of Higher education studies / total nr. Years of the course: **(only applied to students)**

Are you a working student? **(only applied to students)**

Nr. Years working as a teacher: **(only applied to teachers)**

Nr. Years working apart from teaching: **(only applied to teachers)**

### **UBC Previous experience and motivations**

Is it the 1<sup>st</sup> time that you are involved in University-Business initiatives?

If not, is it the 1<sup>st</sup> time that you participate in *Demola*? In which other UBC initiatives did you participate?

Which are your motivations to participate in UBC initiatives?

### **Demola's benefits**

Please refer the benefits that you expect that teachers take from participating in *Demola* co-creation projects, and please rank the top 3 being 1 the benefit you consider the most important.

(Marking scheme:)

- Gain technical knowledge
- Gain entrepreneurship skills
- Gain/train soft skills. Please give examples
- Enlarge companies' network
- Update their teaching contents
- Update their teaching methods
- Gain knowledge in a specific sector/product
- Be socially responsible
- Other (please specify):

Please refer the benefits that you expect that companies take from engaging in *Demola* co-creation projects, and please rank the top 3 being 1 the benefit you consider the most important.

(Marking scheme:)

- Response to the proposed challenge
- Access to talented students
- Promote relationship with the Higher Education institution
- Obtain community recognition
- Respond to corporate responsibility goals
- Other:

Please refer the benefits that you expect that students take from engaging in *Demola* co-creation projects, and please rank the top 3 being 1 the benefit you consider the most important.

(Marking scheme:)

- Gain technical knowledge
- Gain entrepreneurship skills
- Gain multicultural experience
- Gain knowledge in different areas of study
- Gain/train soft skills. Please give examples
- Expand student network
- Gain access to recruiting personnel within companies
- Gain knowledge in a specific sector/product
- Be socially responsible
- Other:

## Employability

Please select from the following list the top 10 attributes that in your opinion graduates should have to maximize their employability potential, and rank them being 1 the most important one.

Please select from the following list the top 10 attributes that you expect *Demola* co-creation projects will promote in graduates engaged in this initiative, and rank them being 1 the most important one.

Aspiration	Ethics including work ethic	Presentation skills
Autonomy	Flexibility/Adaptability	Problem-solving
Career management	Giving and receiving feedback	Professional knowledge
Communication skills	Independent thinking	Research skills
Creativity	Initiative and self-direction	Resilience
Critical thinking skills	Interpersonal skills	Self-management
Customer awareness	Language skills (particularly 2nd language skills)	Social intelligence
Digital literacy	Multi-tasking	Team-working
Efficiency	Numeracy	Time-management
Emotional intelligence	Opportunity awareness	Willingness (and capability) to learn
Entrepreneurship	Positive attitude	Writing skills
		Other (please specify):

## Communication of *Demola*'s benefits

How do you propose to communicate *Demola*'s benefits?

### **Questions to Demola and IPS representatives**

Role:

Who / Which institution had the initiative to implement *Demola* co-creation projects at *IPS*?  
If *Demola/IPS* institution, which are its motivations?

Is *IPS/Demola* involved in other University-Business Cooperation related activities, besides co-creation projects? If yes, which?

How are *Demola*'s benefits evaluated and communicated?

### **Question to IPS representative**

Which are the criteria to select teachers and students in terms of *Demola*'s participation?

Please select from the following list the benefits that you expect that *IPS* takes from engaging in *Demola* co-creation projects, and please rank the top 3, being 1 the benefit you consider to be most important.

(Marking scheme:)

- Provide entrepreneurship education to students
- Provide soft skills education to students. Please give examples
- Obtain additional funding
- Expand companies' network to evaluate R&D potential
- Gain knowledge in a specific sector/product
- Be socially responsible
- Other:

## Appendix B – Demola's Benefits for the different stakeholders

### Students' Benefits

	Students' View						Count	
Gain technical knowledge	1	x	1	1	x	x	1	7
Gain entrepreneurship skills		3		x		2	1	2
Gain multicultural experience		2	x		x		x	3
Gain knowledge in different areas of study	2	x		x	x		x	6
Gain/train soft skills. Please give examples	3		2	2	3	2	x	6
Expand student network				x			3	3
Gain access to recruiting personnel within companies	x	x			3			4
Gain knowledge in a specific sector/product	x		x	x	x		x	5
Be socially responsible	x		1	x	x	x	x	6
Other:	x			3		1	x	4

	Teacher's View						Count	
Gain technical knowledge	x				3		x	3
Gain entrepreneurship skills	1	1	x		x	x		1
Gain multicultural experience	x			3			3	3
Gain knowledge in different areas of study	x		2	1	x	1	x	6
Gain/train soft skills. Please give examples	x			2	1	2	1	2
Expand student network	x		x		x	x	x	5
Gain access to recruiting personnel within companies	x			x	x	x	x	5
Gain knowledge in a specific sector/product	x			x	x		2	4
Be socially responsible		3			2	3	x	3
Other:	2	3	x					3

	Companies' View		Count
Gain technical knowledge	1		1
Gain entrepreneurship skills		1	2
Gain multicultural experience		2	1
Gain knowledge in different areas of study	x	x	3
Gain/train soft skills. Please give examples	x	3	1
Expand student network			0
Gain access to recruiting personnel within companies		x	x
Gain knowledge in a specific sector/product	2	x	2
Be socially responsible	3	x	2
Other:			0

### Teachers' Benefits

	Students' View						Count	
Gain technical knowledge	1		2	1		3	3	5
Gain entrepreneurship skills		3		x		2	x	5
Gain/train soft skills. Please give examples				x			2	x
Enlarge companies' network	x		x		2		x	4
Update their teaching contents	3	2	x	x		1		1
Update their teaching methods	2	1	1			3	1	x
Gain knowledge in a specific sector/product	x			3	3		x	2
Be socially responsible			x	x				x
Other:								0

	Teacher's View						Count	
Gain technical knowledge					3	2	x	3
Gain entrepreneurship skills		2	2		x		1	3
Gain/train soft skills. Please give examples	3	1	3	x		x	x	6
Enlarge companies' network	2	x				3	x	4
Update their teaching contents							2	1
Update their teaching methods	1	3	1	1	1	3		6
Gain knowledge in a specific sector/product	x	x			2	x		5
Be socially responsible		x		x	x			1
Other:					x			2

	Companies' View		Count
Gain technical knowledge	1		1
Gain entrepreneurship skills		x	1
Gain/train soft skills. Please give examples		3	1
Enlarge companies' network	x	1	2
Update their teaching contents		2	1
Update their teaching methods		1	2
Gain knowledge in a specific sector/product	2	x	2
Be socially responsible			3
Other:			0

**Companies' Benefits**

		Students' View						Count
Response to the proposed challenge		3	2	1	1	1	2	6
Access to talented students			x				2 x	3
Promote relationship with the Higher Education institution	1	1	1	3	2 x		3	7
Obtain community recognition	2			2				3
Respond to corporate responsibility goals	3		3 x		3	3 x		6
Other:		2						1
		Teacher's View						Count
Response to the proposed challenge	2	3		1	3	2	3	6
Access to talented students	x				x			2
Promote relationship with the Higher Education institution	3	2	1		1	3	2	6
Obtain community recognition	x				3 x			3
Respond to corporate responsibility goals	1	1	2	2	2 x	x		7
Other:	x						1	3
		Companies' View		Count				
Response to the proposed challenge	1	3 x						3
Access to talented students	x							1
Promote relationship with the Higher Education institution		2	1					2
Obtain community recognition	3 x		2					3
Respond to corporate responsibility goals	2	x						2
Other:		1	3					2

## Appendix C – Employability Attributes

Employability Attributes	Students' view	Teachers' view	Companies' view
Aspiration			
Autonomy		Demola	Demola
Career management			
Communication skills	Demola	Demola	Demola
Creativity	Demola	Demola	
Critical thinking skills	Demola	Demola	Demola
Customer awareness			
Digital literacy			
Efficiency			
Emotional intelligence			
Entrepreneurship	Demola		
Ethics including work ethic			
Flexibility/Adaptability		Demola	
Giving and receiving feedback			
Independent thinking		Demola	
Initiative and self-direction			Demola
Interpersonal skills	Demola		Demola
Language skills (particularly 2nd language skills)			Demola
Multi-tasking			Demola
Numeracy			
Opportunity awareness	Demola		
Positive attitude			
Presentation skills			
Problem-solving	Demola		
Professional knowledge			
Research skills		Demola	
Resilience			
Self-management			
Social intelligence			
Team-working	Demola	Demola	Demola
Time-management		Demola	Demola
Willingness (and capability) to learn	Demola		Demola
Writing skills			
Other (please specify):			
Note: =>4 responses for teachers/students, =>2 for companies			
Labor Market			