

# EXPLORING E-PORTFOLIOS: ILLUMINATING ACCOUNTS OF THE PEDAGOGICAL INNOVATION TRAINING PROGRAMME AT THE POLYTECHNIC INSTITUTE OF VISEU

Susana Amante

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## ABSTRACT

*Every educational institution strives for pedagogical excellence, driven by the goal of providing the most effective and impactful learning experiences to its students. This is no different at the Polytechnic Institute of Viseu (IPV) and other Polytechnic Institutes participating in a Pedagogical Innovation Training Programme developed within a consortium committed to enriching educational methodologies and tools. There is evidence that innovative pedagogical methodologies lead to enhanced student engagement, foster meaningful interactions, promote critical thinking and problem-solving skills, and ultimately better academic achievement. This study focuses on the training course on pedagogical innovation offered to the teaching staff from IPV and vocational schoolteachers from the region, by examining their reflective portfolios. We aim at illuminating the impact and efficacy of the initiative in fostering active methodologies and innovative pedagogical tools, employing qualitative analysis to uncover the nuanced perceptions of the IPV participants in the six editions of the programme (2021-2023). The findings reveal that they value active methodologies, intercultural and multidisciplinary collaboration, and the integration of industry-aligned skills development, even if we encounter accounts of challenges faced during the implementation process of the training course. Ultimately, this study contributes to assessing the initiative's impact and underscores the pivotal role of innovative teaching methodologies in striving for educational excellence. In light of the findings, policy recommendations include encouraging continued investment in pedagogical innovation training programmes, supporting interdisciplinary collaboration, fostering industry alignment, and addressing implementation challenges to ensure the effectiveness of such initiatives.*

**Keywords:** Pedagogical innovation; Portfolios; Teacher's perceptions; Training Programme; Project tools and tasks

## INTRODUCTION

In a time known for rapid technological progress, the demand to ensure equitable access to digital resources and quality education has attained unprecedented prominence. The pandemic situation that was experienced in 2020 and 2021 as a result of the need for the whole society, namely Higher Education

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*Susana Amante is an associate professor at the School of Technology and Management of the Polytechnic Institute of Viseu (IPV), Portugal. She holds a Ph.D. in English Philology from the University of Salamanca, and she was awarded the "Doctor Europaeus" Mention through a joint supervision programme with the University of Coimbra (2011). She was PI of the 'Learning based on co-creation processes' project at IPV (2021-2023), and her research spans Literatures and Cultures, Gender Studies, Language Didactics, Translation, and Languages, Innovation and Entrepreneurship. Currently, she is the Pro-President for International Affairs and leads the Experiential Learning Work Package (WP3) in the EUNICE Alliance.*

Institutions (HEIs), to transform their *modus operandi*, in a short period of time, and create resources adapted to virtual environments, has greatly exacerbated this situation (Hass, Laverie & Cours Anderson, 2020; Chhabra & Ambreen, 2021; Winch et al., 2021; Nani & Ndlovu, 2022; Konstantinou, Nachbagauer, & Wehnes, 2023).

Even before, as postulated by Antunes (2012, p. 451), “the Bologna Process (BP), the Education & Training 2010 programme (E&T 2010) and the Copenhagen Process (CP) have gradually been highlighted as being the carriers of dramatic changes.” At the time, there was a growing recognition that traditional knowledge transfer from teachers to students was inadequate. A notable shift was needed towards a more engaging, participatory approach emphasising learning outcomes (ibidem). This shift aimed to better prepare students for the complex challenges of the modern world. Active pedagogy started to emerge as a transformative force, revolutionising the way students learnt, and empowering them through facilitation, problem-solving exercises, simulations, co-creation, and real-world application of knowledge. Socialisation, externalisation, combination, and internalisation, encapsulated in the SECI model (Songkram & Chootongchai, 2020), delineate the four pivotal modes of knowledge conversion essential for fostering innovation. Therefore, rather than rote memorisation and passive learning methodologies, in a one-size-fits-all approach, students were encouraged to take an active role in their learning process. They were urged to share their individual experiences, emotions, and tacit knowledge, to develop their critical thinking, creativity, leadership, adaptability and, among others, effective communication skills. These skills are more than ever essential attributes for success in today’s interconnected and globalised world.

This transition to active methodologies went hand in hand with a change in the role of the teaching staff. According to Kurvits, Laanpere, Väljataga, and Robtsenkov (2019, p. 177), “The modification of the existing teaching practices is one of the greatest pedagogical challenges today, and teachers need support in this process of changing their approach to teaching.” Some of them have, thus, searched for training on pedagogical innovation, and they have become designers of learning experiences and facilitators. This, in turn, has required careful planning, adequate classroom resources, integration of technology, and government and institutional policies for implementation to be truly functional.

According to Lambriex et al. (2020), the cultivation of a culture of innovation has emerged as a pivotal factor significantly influencing innovative practices within educational organisations. Despite its recognised significance, a scarcity of comprehensive studies on this topic of pedagogical innovation persists, as noted by Fuad et al. (2022). This article contributes positively to, addressing this gap, offer some insights that can guide the design and implementation of forthcoming teacher training programmes that aim at nurturing pedagogical innovation, thereby elevating educational practices. The discussion of the specific initiative to be described below represents a noteworthy step in fortifying this endeavour. In this study, we extend the knowledge of novel approaches and tools that contribute to active pedagogies and that bring academia closer to the needs of the labour market while, at the same time, enhancing students’ motivation and skills (Amante & Fernandes, 2023). We will focus particularly on the programme entitled Demola Portugal Initiative (2021-2023), held at the Polytechnic Institute of Viseu (IPV) and other Portuguese Polytechnic Institutions, and attempt to answer two questions: 1) which methods and tools were introduced by the programme, namely through one of its projects, *Aprendizagem com base em processos de cocriação* [Learning based on co-creation processes] (ref. no. POCH-04-5267-FSE-000818)?, a training course on pedagogical innovation for teaching staff, and 2) what is the participants’ perception of the tools and approaches learnt. In trying to answer these research questions, we will start with some theoretical considerations on the importance of bringing innovative pedagogical methodologies and tools to the classroom or other learning environments; next, in a second section, we will provide the readers with a framework that will help them visualise the Initiative and, afterwards, we will delve into data analysis, by describing a) the methodology and sample selected, and b) examining some of the assertions extracted from the final e-portfolio each teacher/professor produced as a participant of the programme, that is, as a trainee and facilitator. Finally, this article will summarise the main conclusions of this study, looking ahead and

extrapolating this active methodology as a potential scenario that can influence educational practices across various levels and geographic boundaries.

## **THE GROWING IMPORTANCE OF ACTIVE LEARNING AND INNOVATIVE PEDAGOGICAL TOOLS IN HEI: SOME THEORETICAL CONSIDERATIONS**

*Introduced in the nineties, Active Learning methodologies aim at giving responsibility to the student of his/her own meaningful learning, engaging him/her in meaningful learning challenges that require higher-order thinking such as analysis, synthesis and evaluation. (Mercat, 2022, p. 161)*

Active learning methodologies have been present in education for a long time. Even before the nineties, Piaget and Vygotsky had already laid the foundation for the principles underlying active learning, by highlighting the importance of hands-on learning experiences and the influence of interpersonal interaction on cognitive development. The roots of active learning, thus, cannot be pinpointed to a specific decade, once these methodologies have been evolving over time (Chinn & Iordanou, 2023). In Higher Education Institutions (HEIs), this paradigm shift in teaching methodologies is even more prevalent and, for this to happen, there has been a very important role played by innovation intermediaries. These intermediaries facilitate and accelerate innovation, by bridging gaps in knowledge and resources and connecting academia with various local organisations, and with experts and other stakeholders, who act as catalysts in the innovation ecosystem. Most often, they provide training, expedite knowledge exchange, and enhance collaboration, among so many other benefits, aligned with specific Sustainable Development Goals, and summarised by Koria et al. (2022, p. 2) below:

*These innovation intermediaries traditionally support knowledge diffusion, technology transfer, brokering, innovation management, intermediation services and systems and networks (...). They also support the aims of the Sustainable Development Goal (SDG#17), as multi-stakeholder partnerships are an important vehicle for sharing both global and local knowledge, expertise, technologies, and resources to systemically support human development (...). Through the combined OI-UIC focus, the innovation intermediaries help to foster innovation (SDG#9), decent work and economic growth (SDG#8), as well as access to quality education (SDG#4). They support combining global, local, internal and external knowledge (...), and open, flexible and collaborative modes of working that support partnership-forming practices (...). Engaging universities enables systemic approaches to societal challenges through shared value within these partnerships (...).*

As we will make clear in the next section, drawing upon insights and feedback from intermediaries, experts representing partner entities or other stakeholders is very important to ensure best practice. The intermediaries help HEIs integrate innovative pedagogical tools related to general innovation and entrepreneurship that foster collaboration, enable engagement and help co-create tangible value (Rodrigues & Mourato, 2023). These tools can encompass a wide spectrum of technologies, from virtual reality (VR) and augmented reality (AR) to gamification and interactive simulations, to quote just a few. Besides this, videoconferencing, email messaging and discussion threads on different social media channels, the use of polls and remote collaboration platforms, such as Miro and Canva for example, and multimedia sharing, all these tools facilitate interaction and knowledge exchange among students, teachers/facilitators, other experts and stakeholders. By immersing students in experiential learning environments, using some of the tools above, HEIs enhance engagement, critical thinking, and practical application of knowledge (Bertran et al., 2022).

In fact, research has stressed the importance of the application of knowledge in real-world scenarios. This can involve contributing to local communities, connecting students' learning experiences

to their immediate surroundings, that is through Place-based learning, or by opting for a broader approach, Project-based learning, implemented in various contexts, often across multiple disciplines, in an attempt to create a tangible product or presentation that demonstrates how a challenge could be solved. Herodotou et al. (2019, p. 2) explain that “Place-based learning derives learning opportunities from local community settings, which help students connect abstract concepts from the classroom and textbooks with practical challenges encountered in their own localities.” As mentioned before, project-based learning is not necessarily tied to a specific geographic location and, as Amante et al. (2021, p. 220) point out when referring to a project held in Portugal, Poland and Turkey, with participants from different fields, the most important thing is that “... students are actively involved in the learning process, sharing knowledge while trying to answer authentic questions and problems derived from real-world contexts and, ultimately, putting together a final product that addresses the core challenge.”

Even if these approaches are not the same, they both emphasise active and experiential learning. Through immersion in real-world challenges, sometimes posed by community partners, authentic learning has been working as a powerful educational approach. It bridges the gap between theoretical knowledge and practice, transforming the traditional classroom and even going beyond it to dynamic environments where students actively engage with genuine problem-solving scenarios. Bauman further elaborates on this, particularly focusing on the teaching of strategic management, but the trend described below can also be applied to societal challenges:

*... a recent trend in teaching strategic management is to give students' authentic experience to help them understand the challenges of a business environment (Domke-Damonte, Keels, and Black 2013). Students are partnered with local businesses and complete a project that benefits all the participants. Students, thereby, gain experience in a real-life business situation, in which they have to develop a strategy and present it to businesses owners and/or their classmates. (Bauman, 2018, p. 214)*

As these real-world scenarios mirror life itself, this active learning approach enables students to identify problems, interact and collaborate in complex environments, to devise effective solutions from multiple perspectives. This goes in line with what Fullan describes as “new pedagogy”, as Kurvits, Laanpere, Väljataga, and Robtsenkov (2019, p. 178) observe:

According to the concept of “new pedagogy” suggested by Fullan (...), pedagogical innovation is defined through changing partnerships between teachers and students in which the learning process becomes a collaborative way of discovering, creating and using knowledge in a ubiquitous technological context. The main learning outcomes of new pedagogy are the student’s ability to learn and develop continuously while persevering through the challenges that he/she comes across during real-life situations.

Among the many innovative pedagogical approaches that have emerged as transformative methodologies and have reshaped the learning landscape, design thinking comes as highly impactful, as it is a human-centred approach to problem-solving that encourages students to empathise with the perspective of the end-users or stakeholders in order to understand their needs, desires and pain points. Then, they define and reframe the problem to ensure that a focused and meaningful solution is achieved; they ideate, that is, brainstorm unconventional ideas; they transform their selected ideas into prototypes (e.g., mock-ups and other physical models or less tangible products, such as the description of future scenarios); and, finally, they test and refine those solutions following a process of feedback and iteration. However, Avsec and Savec (2022, p. 3) remind us that “[w]hen performing design thinking, educators should focus on practising and receiving feedback from experts in the field”; otherwise, the whole process may fail, and the outcomes may not meet expectations.

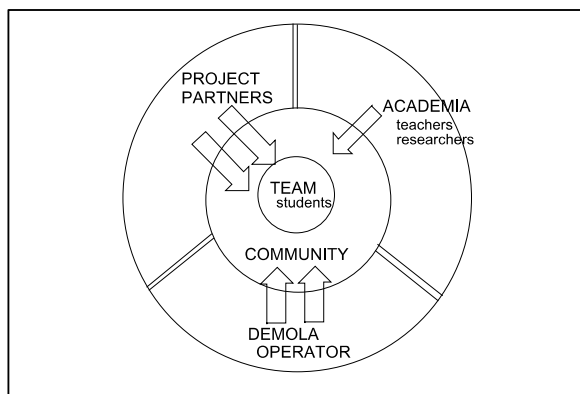
This collaboration with “experts in the field” mirrors the real-world nature of many professional environments, as students have to learn to work in a team, communicate effectively, make informed decisions under sometimes uncertain conditions, delegate tasks, and leverage diverse skill sets, namely soft skills, so needed for success in the workplace.

In this next section, let us get to know Demola Global, the intermediaries between academia and community partner entities, who work as “the ‘engines’ of innovation, playing a significant role through setting up hubs, facilitating learning, orchestrating knowledge-intensive services, and brokering activities to enable commercialisation, engagement, and value creation” (Koria et al., 2022, p. 3).

## A GLIMPSE OF THE DEMOLA PORTUGAL INITIATIVE AND THE METHODS AND TOOLS USED

*Since 2008, Demola has maintained the foundations of their business model, which are the creation of networks and the exchange of value through the solution of problems: first local, then regional and now global. (...) In addition to continuing with business projects connected with students, they have launched pilots for the attention of students around the world to address global problems. (Koria et al., 2022, p. 7)*

Established in 2008, as part of the “Creative Tampere 2006-2011” initiative, Demola went from significant regional success to swiftly garnering global expansion due to the support of the Tampere municipality and three co-located universities, in an endeavour undertaken and greatly facilitated by the Nokia Research Centre and the Hermia Group (Amante & Fernandes, 2022; Catalá-Perez et al., 2020).



**Figure 1. Demola partners (Source: Kilamo et al., 2011, p. 308)**

Nowadays, Demola Global is a renowned innovation platform that operates internationally at the nexus of academia, industry and society, as shown in Fig. 1, encouraging cross-cultural collaboration and problem-solving, in 18 countries, with over 50 Demola Alliance Partner universities worldwide (Demola Global, 2023a).

Within the Portuguese context, the Demola Portugal Initiative was launched in 2021 and it involved a consortium of Portuguese Polytechnic Institutions that ran two concurrent projects, *Aprendizagem com Base em Processos de Cocriação* [Learning based on Co-creation Processes] and *Link Me Up – 1000 Ideias* [1000 Ideas]. The first one was a training course on pedagogical innovation, held at 14 Portuguese Polytechnic Institutes, and directed towards their teaching staff and vocational school teachers from each of the 14 regions. The second project was held in 13 Polytechnic Institutes, and it intended for intercultural and multidisciplinary teams to collaborate on real-world challenges posed by diverse organisations from the community, in an attempt to develop more than 1000 ideas, while equipping students with problem-

solving skills, cultivating an entrepreneurial mindset and allowing them to be prepared for the dynamic demands of the labour market (Fernandes & Amante, 2022). Simply put, these two projects were interdependent since one trained the teaching staff, providing them with innovative pedagogical tools, to become facilitators of the teams of students, that is, it prepared the implementation.

The Demola Portugal Initiative lasted from 2021 to 2023 and at each Polytechnic Institute it implied the training of eight of its Professors and two other vocational school teachers from the region per semester, making up an approximate number of 960 teaching staff, because in Leiria and Coimbra the number of teams doubled in each of the six batches, and at IPV one of the participants gave up and in the sixth batch there were 11 trainees/facilitators rather than 10.

The training was intensive and took place synchronously every week, on Mondays for some Polytechnic Institutes and for the remaining ones – namely IPV – on Tuesdays. On top of the scheduled full days of training, the process also included execution clinics, in which trainers worked alongside the participants, answering questions, and providing a variety of support based on their demand, and there was also asynchronous time allocated, in a total of 344 hours per batch.

Forging a pathway towards educational excellence, this initiative used several educational tools, such as a) mind maps, that is, visual representations of ideas connected through branches and used to brainstorm and organise thoughts, plan projects and summarise information; b) PESTLE analyses, used to gain a comprehensive understanding of external – Political, Economic, Social, Technological, Legal and Environmental – factors that inform strategic planning and decision-making aligned with the goals and values set; c) affinity diagrams, used to group related data generated during brainstorming sessions or research, after collaboratively identifying common themes and patterns; d) ‘How might we...’ questions, used to encourage a shift from viewing a challenge as a problem to seeing it as an opportunity, since these open-ended inquiries invite students to consider multiple perspectives and enable divergent thinking; e) megatrends discussion, which implies anticipating future challenges and opportunities by analysing long-term, transformative shifts that impact societies; f) value proposition canvas, used to guide students in designing solutions that cater to specific user needs and provide meaningful value; g) other design thinking related tools, such as persona creation and prototyping, among others.

The participants in the training course learnt how to use these tools and then, became facilitators of their teams of students, helping them complete the tasks, by explaining the steps involved in using each tool and creating a supportive environment for exploration, creativity, and collaboration. Providing feedback on their work and encouraging them to refine their ideas was an integral part of the iterative process that fostered the students’ growth and improved their problem-solving skills and creative thinking abilities. A final report was asked at the end of the process so that students could reflect on their insights gained and their experiences because reflection reinforces learning and promotes metacognition. The teaching staff also had to reflect on the training course and on their role as facilitators in a digital portfolio. In the next subsection, we will focus on the teachers’ learning journey, documented in those e-portfolios so that we can understand the participants’ perception of the tools and approaches learnt.

### **THE USE OF E-PORTFOLIOS TO ASSESS THE PARTICIPANTS’ PERCEPTIONS OF THE DEMOLA METHODOLOGY AND TOOLS**

Portfolios have widely been used to showcase the work, growth, skills and accomplishments of an individual or of a group over a specific period of time. Besides this, they serve as a reflective tool in various fields and contexts, namely for educational purposes, professional development, and creative endeavours, and they also encourage critical (self-)assessment. According to Amante (2021, p. 102), portfolios are

useful for students to “... reflect on where they started, their learning progress, outcomes and what remains to be learned and applied. It is also an instrument that the students can keep and resort to whenever they need.” The same holds true for the teaching staff that participated in the training course designed and conducted by Demola, and that were prompted to reflect on their learning journey, by including samples of work that demonstrate the trainees’ learning of methods and tools, the skills acquired and the impact they made as facilitators. In the instructions that Demola gave the trainees, the trainers also suggested treating this tool as memorabilia, by identifying aspects, moments, or phases that were significant during the process, capturing not only the technical skills but also the personal and emotional aspects of their experience.

## METHODOLOGY, PARTICIPANTS AND DATA ANALYSIS

At the Polytechnic Institute of Viseu, sixty participants from different fields, mainly in their forties, females, and holders of a PhD, delivered their e-portfolios and completed the training course within the project entitled “Aprendizagem com Base em Processos de Cocriação [Learning based on Co-creation Processes]” throughout the six batches that ran from 2021 to 2023 (cf. Table 1).

**Table 1: Demographic overview (N=60)**

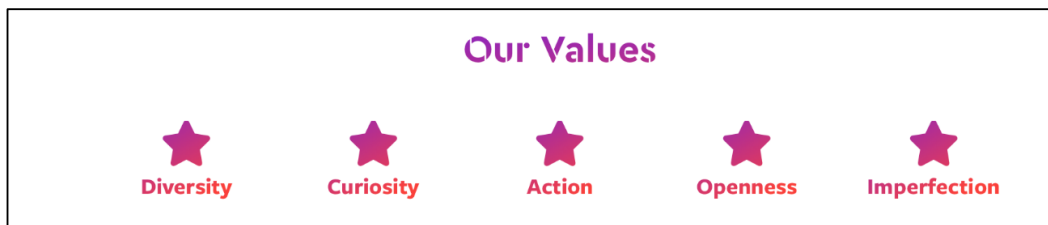
Variable	Percent	Variable	Percent
<b>Data collection round</b>		<b>Education</b>	
Jul-21	16.67%	Bachelor’s degree	11.67%
Jan-22	16.67%	Master’s degree	8.33%
Jul-22	33.33%	Doctorate degree	80%
Jan-23	16.67%		
Jul-23	16.67%		
<b>Gender</b>		<b>Age range</b>	
Female	66.67%	Under 30	0%
Male	33.33%	30-39	16.67%
Other	0%	40-49	61.66%
		50-59	16.67%
		60 and above	5%

Bearing in mind those e-portfolios, the researcher identified, extracted and categorised relevant text segments. The objective was to unveil the participants’ nuanced perceptions of the tools and approaches they acquired through the training programme, also placing significant emphasis on understanding their experiences throughout the implementation phase. Thus, this study follows qualitative research methodology (Gelo, Braakmann & Benetka, 2008), particularly content analysis (Vaismoradi, Turunen & Bondas, 2013), to reveal the thoughts, insights and experiences reported by the participants. Given that the perspective of participants from the first and second editions of the Initiative was briefly discussed in a prior study conducted by Amante and Fernandes (2023), we will now prioritise the most representative extracts from the reflections of participants<sup>4</sup> in the latest batches of the programme, to gain a comprehensive understanding of their perceptions, observations, and transformative journey, as mentioned. This strategic

<sup>4</sup> It should be noted that we will use the initials of participants, most of the time in alternating order throughout the analysis, to maintain confidentiality and uphold participant anonymity. This precautionary measure aims to protect the privacy of individuals involved in this study while facilitating an unbiased examination of their reflections.

prioritisation becomes particularly pronounced due to the recurring prominence of specific categories. These include efficient time management, handling of uncertainty, utilisation of ICT tools, opportunities for internationalisation, networking, skill diversification, and fostering effective communication and interaction within interdisciplinary and multicultural teams.

These categories encapsulate the key dimensions and focal points that define the Demola values and approach, as seen in Fig. 2, and that are achieved through the integration of tools designed to foster curiosity, creativity, strategic thinking and solution-oriented perspectives, open communication and intercomprehension, responsibility but also the awareness that failure and imperfection lead to adaptability, continuous improvement, and growth. In fact, at the heart of Demola Global lies the dynamic interplay between all these principles and the tools that underscore a pedagogical commitment to experiential learning, innovation, and holistic skill development among all programme participants, as we will make clear in the next few pages.



**Figure 2.** The set of core values that Demola Global establishes to guide its approach.  
(Source: Demola Global, 2023b)

## A LOOK AT THE RESULTS AND DISCUSSION

In most e-portfolios, the participants valued the **ICT platforms** put in place by Demola, but some disclosed very limited familiarity with and lack of time to explore the tools, a difficulty also felt by their teams. In fact, **managing time** was a challenge in itself, because the training was intensive and time-consuming, and the facilitation process demanded from them even more dedicated time and attention since they were expected to answer questions, provide feedback and ensure that the team members were on the right track. For instance, a professor who was a trainee in the 5th batch brilliantly summarised the process, providing a critical analysis of the intricacies involved and potential areas for improvement:

*Starting with the end, the course ‘Aprendizagem com base em processos de cocriação’ was very positive and appreciated by the (...) facilitator. (...) The DEMOLA methodology of co-creation is very interesting and well structured, making it possible to dissect problems/systems/organizations, envisioning key issues, namely: which are the most relevant agents; trends in characterizing the current situation; insights into what is bad/less good (making the counterpoint to ‘what should be’); signs (strong or weak) of change that are already happening; ideas that can seriously leverage/stimulate change. Of course, there is always the ‘bitter’ taste – the lack of dessert (?) – of not emerging more final solutions – making it happen – but that is also not what is intended...! Paradoxically (?), although the deadlines of the tasks (excessive number for the time available) succeed each other, with no time to properly prepare or digest the tasks already performed, many of the online and face-to-face sessions gave the feeling of being productive, perhaps to drag themselves in time. There is doubt as to whether this is natural in the process and one of the variables that make the success of the DEMOLA methodology and the co-creation process. (B.P.A., 5th batch, sic)*

This critical appraisal finds resonance among other trainee participants in the training course, who, for instance, complained that “My team always felt that they had little time to do things with the quality that they deserved, and so they always felt that everything was badly done and without foundation” (P.R.F.,

4th batch, sic). Time management always implies acknowledging and accommodating the diverse levels of enthusiasm and commitment, as well as time-related expectations and predispositions of team members and grappling with unforeseen disruptions. Some participants regarded the lack of time and the students' varying availability and engagement levels as obstacles that hinder the successful completion of this type of projects:

*On the other hand, I must point out something that was difficult to manage: the synchronization of meetings and the orientation for collective tasks. The typical learning model in Portugal is essentially individual, where each student plans their own activities. Since it is a project that implies carrying out different tasks, but from a more collective perspective, it was difficult to get people together and discuss as a group. I don't think, however, that this difficulty is a limitation of this pedagogical model, I think that the Portuguese model is not yet built for this kind of collaboration. (L.M., 6th batch, sic)*

Other trainees/facilitators were aware that it was something to be addressed proactively, and they attempted to **find strategies and be flexible** to mitigate any bottlenecks and pitfalls, harnessing the collective strengths of the team:

*It wasn't always easy to find time compatibility for weekly meetings. But this context also presented itself as a parallel challenge, which was magnificently overcome with the five sharing meetings with the expert, (...) in five different weeks. And because willpower is highly transformative, we were all able to take advantage of this sharing by the specialist, the students, the partner entity, and myself, scheduling compatible times for all. They were very enriching meetings, highly valued by the students, who considered them an asset for their development. (C.E., 5th batch, sic)*

The commitment to proactive problem-solving and flexibility, as exemplified by this and other trainees and facilitators who recognised and addressed the same challenges, aligns with the values of Demola Global, mentioned in the section above. This ethos is actually the Demola methodology itself and it leads to another common thread that could be found in most e-portfolios: the **need to manage uncertainty**. Most reported that being a facilitator, that is, being a "guide on the side", is completely different from being a "sage on the stage" in a classroom. By embracing these projects, they had to adapt to unexpected situations, because they were not in control over the content delivery and the direction of the learning process. Actually, in this type of projects, the students are seen as talents, they take ownership of their learning and, guided by a facilitator in interaction with experts, they question, explore, discover, and co-construct knowledge. On this matter, we are told:

*One of the most difficult things about the facilitation process is the habit that we have to "command" all the process of projects where we have a defined goal. The facilitation process is different because I had to let the students make their own path. The collaboration with the partner company was difficult since companies are usually very busy and do not have a lot of time to participate in co-creation projects. Nevertheless, the company participated in the definition of the challenge and accompanied, when possible, the evolution of the project. After the ending of the training course, I feel that I am much more prepared than I was in the beginning of the process and sometimes I feel I should start it again. I will surely take this training into account in the preparation of my next course in order to give students a more active role in the learning process.*

*I think the training will help me to better conduct my project teams in the future. I have learned new tools for collaborative work such as the use of Miro board and Canva and they will be very important in the future. (E.B., 6th batch, sic)*

As we notice above and as we can find in some more testimonials below, the fact that the students are placed at the centre of the learning process, rather than having the teaching staff as the sole conveyors

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of knowledge, can actually yield significant benefits for student engagement and learning outcomes, but for the IPV participants in the programme it also introduced a level of uncertainty, because they were required to relinquish some control and allow students to take the lead in their own learning journeys. Professors and vocational school teachers became facilitators who depended on sometimes uncooperative partner entities and on the students' willingness to take advantage of this type of projects. That is why active learning methods and tools play such a crucial role in facilitating this approach. One of the trainees puts it metaphorically:

*A kind of plunge into the unknown: it seems to me to be a good image for the way I felt at the beginning of this process. Starting challenge, partner, student team, online sessions and bootcamps, facilitator and co-creation processes were the pieces to integrate for a path with meaning. How would this integration take place? I had no idea! This principle of uncertainty was a little scary. After all, the coordinates of traditional trainings did not seem to apply in this new journey. It would be necessary to learn new methods of navigation and trust the winds. (S.J., 5th batch, sic)*

And in another e-portfolio, we read:

*In the initial stages I had a little weird feeling what am I getting myself into, what is this whole process going to be like? That's what was in my mind. I must admit that in the initial phase of the process it was a little bit bumpy. (...)*

*We used the tools provided by Demola for the interaction process and facilitation with the students (Demola chat, email, Mic, etc). I requested that they create a group on Whatsapp for the team. In the initial phase my contact was not included, I did not push for that either, to let them have autonomy. (L.P., 3rd batch, sic)*

In fact, besides the **tools that were part of the training**, there were several teachers/trainees that advocated for the **adoption of more widely used apps**, such as WhatsApp, during facilitation, because this instant messaging platform allows users to quickly send messages, multimedia content, and make voice or video calls: "Between me and the students/partner entity/co-facilitator, in addition to the aforementioned channels, we also used email and WhatsApp, mainly because the partner entity also preferred to use these contacts" (C.E., 5th batch, sic). WhatsApp enabled real-time communication and collaboration among team members and, in many cases, as seen, with facilitators, experts and company representatives, but it could also be used to send reminders about upcoming assignments and their deadlines:

*In addition to these weekly meetings, the team had a WhatsApp group and the Demola chat (...), where several messages were exchanged and shares were made about the topic being studied. Tasks and activities that each element of the group should fulfill were also defined and it was decided which team member would submit the weekly task on the platform. (D.A.S., 5th batch, sic)*

All the e-portfolios **extensively address the tasks and tools** with a substantial degree of detail. The participating teaching staff were very enthusiastic about them, and it was another common theme, as observed below:

*Our facilitators knew how to do it masterfully! Everything I learned and was able to pass on to the students was enormous. I also understood how this program is so well organized, with all the materials available weekly in Training materials, smoothing the process, that in bootcamps we are allowed to experience in advance all the steps that we would facilitate with the students, for later, with the work they develop in team and insert in Demola Atlas, namely: Stakeholder/User Group Identification (long list), Selected target groups (short list), Empathy maps (& Synthesis), Design Insights, Present Report, Future Questions (What if...? & How might we...?), Signals, Future stakeholder personas, Signals (a continuing*

*task), Future Solution Ideas, Low-fidelity prototyping (optional – not developed with students), Signals (a continuing task), Final Report. (C.E., 5th batch, sic)*

The detailed list of sequential tasks, which started with personal mind mapping, not mentioned in the extract above, serves as a set of tools that were discussed and tested in the training sessions to effectively tackle the real-case challenges. The inclusion of various tasks such as empathy maps and low-fidelity prototyping, for instance, contribute to a comprehensive problem-solving approach. Many more participants go on to highlight their positive experience, underscoring the utility of these tasks developed on Miro boards, Canva, and other collaborative platforms, such as Atlas, which proved to be highly advantageous, even if they seemed not to be very user-friendly for some at first:

*... Atlas that was used from the beginning with “Team building”, “Membership acceptance”, “Contract signing”. Then we continued with “Tasks” submission, “Team member evaluations” and “Access to team results”. It was not very intuitive at first, but with all the patience of the facilitator, we were able to learn more about the platform and be more comfortable with it. It turned out to be a very useful tool. (B.S., 5th batch, sic)*

*Miro is not, at first glance, the most intuitive tool. It requires some exploration time before we feel comfortable using it. Perhaps for this reason, the team of students (and myself) resisted, at first, using it as a work tool. But, as the students realized that it was a tool that allowed everyone to have access to everyone’s work, giving, in real time, a global vision of the work that was being developed, we started to use it as the main working tool between meetings.*

*It is certainly a tool that I will encourage my students to use in group work. It could be very useful in the group’s internal communication, as well as in my non-face-to-face communication with each of the working groups. (S.J., 5th batch, sic)*

*I had my first experiences using MIRO, CANVA and DEMOLA platform. The first one was very helpful to joint our team’s notes and transform them into next steps by voting on ideas, grouping insights by themes and trends, and crafting workflows and project documentation. The CANVA helped to present in a very beautiful and trendy design our information, as well as working together and at the same time, no matter where we were located. In the same way, the Chat from DEMOLA was a simple and intuitive communication tool, which made it easy for us to stay in touch. (A.L., 5th batch, sic)*

The programme aimed at providing the teaching staff with innovative pedagogical tools, so it comes as no surprise that most e-portfolios focus on **tools and tasks**. Miro, a collaborative virtual whiteboard that seamlessly captures and organises digital sticky notes on an expansive canvas, is always praised as a dynamic tool that provides a digital, fluid, and accessible workspace for real-time collaborative ideation. It is recurrently considered effective in supporting various aspects of project management. Canva is another tool that is lauded for its contribution to creating visually appealing and trendy designs for presenting information. As highlighted in Salim, Saad, and Nor’s “Comparative Study of Low-Cost Tools to Create Effective Educational Infographics Content”, Canva emerges as the tool that “provides major advantages in terms of enhancing the infographics design” (2021, p. 27), and this recognition becomes manifest in the portfolios under discussion. Also commended by every single training participant is the Demola Platform, especially its chat feature, which facilitates straightforward communication, enhancing teamwork and productivity. Although we do not intend to be redundant, we believe that some more examples can only attest to the success of the initiative. As a note, let us clarify that we are choosing just some of the more pertinent quotations from a universe of 60 portfolio reflections, all addressing various aspects of the tools and their impact on the creative process:

## EXPLORING E-PORTFOLIOS

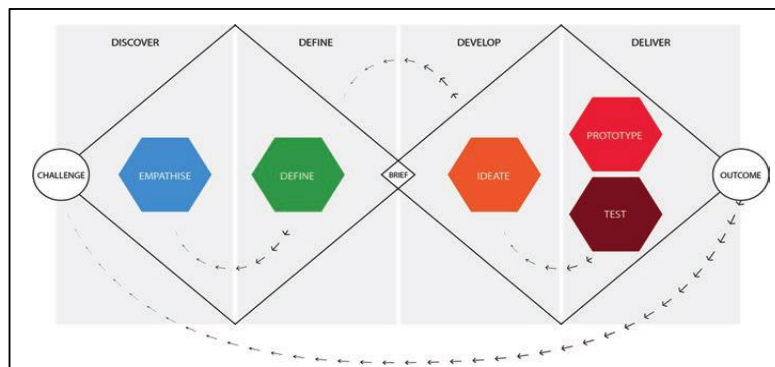
*No less important were the tools I learned to work with. In terms of technological tools, I would highlight the miro platform (...). Regarding the more theoretical tools, I loved working with the empathy maps that taught me to look at people in a different way; I really liked the task related to the future persona and future ideas. Finally, I would like to highlight the signals task that, although not a tool in itself, was a working model that helped us to observe our challenge by analysing what was already being implemented and that went in the same direction of our objectives. (P.R.F., 4th batch, sic)*

*Throughout this phase the method was Design research. Different tools were explored that allowed a broad knowledge about the theme of the challenge (academic articles; Demola reports; observation) and others facilitated a more directed and oriented knowledge (identification of stakeholders – long and short list, interviews, empathy maps, design insights...). (B.A.A., 4th batch, sic)*

*As a teacher, Demola's methodology was particularly useful. The combination between empathy, insights and knowledge provides new ways of thinking and dealing with problem-solving. Therefore, this training provided valuable tools with which it was possible to build insights in every domain, and even improve teaching activities.*

*For students, this project had a significant impact, since for them it was the first time too, they got involved in a co-creation project, dealing with the outside world and dialoguing with companies and associations. All this has elicited on them critical thinking, entrepreneurship, self-motivation, information literacy, other digital skills and creativity. (R.S., 3rd batch)*

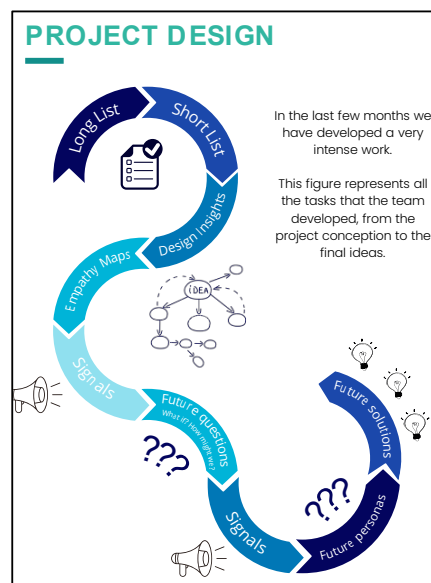
Due to constraints on time available for delving into these design methods, the creative process was driven by a dynamic interplay of self-directed exploration undertaken collaboratively by the teaching staff and their student teams. This proactive engagement encompassed anticipating scenarios, conducting insightful interviews, and employing direct observation. The multifaceted approach extended to the identification of user pains and gains skillfully mapped onto empathy frameworks. Additionally, the teams filled in 'persona' forms, speculated on what users see, feel, think or do, and worked on some form of prototyping – usually opting for low-fidelity, rather than high-fidelity prototyping – with simple sketches to convey an idea and get validation. The methodic progression of the creative process adhered to a deliberate framework, mirroring the Double Diamond Structure. The process transitioned from divergent thinking, where a multitude of possibilities were generated and explored, to convergent thinking, refining and narrowing down these different options into a more focused outcome. This dual-phase approach



**Figure 3** – The five stages included in the divergent and convergent phases that make the joined model of the Design Thinking and Double Diamond processes, as presented by Suoheimo and K. Määttä (2024, p. 86).

facilitates a robust and effective design methodology, as put by Mantelet, Segonds and Jean (2018) and, among many other scholars, as illustrated by Suoheimo and K. Määttä (2024), in Fig. 3.

The tasks and tools are indeed acknowledged as relevant by all participants, namely the students. On the left side, we find a graphical representation of some of the tasks accomplished by one of the teams of students participating in the 5th batch and sketched by them. It can be regarded as the project roadmap, as it provides us with a visual design that allows us to understand the project's progression and key events at a glance. Fig. 4, shown here, was not directly extracted from the facilitator's e-portfolio, but from the original source – the students' final report – to ensure the quality of the content, but she resorted to it as part of her reflection.



**Figure 4** - Team tasks (Source: D.A.S. students' final report, also extracted and used in her e-portfolio)

Besides the tools and tasks, there is a range of benefits that contribute to the participants' personal and professional growth/excellence, such as the perks of **internationalisation** because of the training and bootcamps where there were colleagues from different Polytechnic Institutes, as well as Finnish, Hungarian and Brazilian trainers; valuable **networking opportunities** and **skill diversification**, as the following account, among so many that report the same, makes clear:

*I learned about new tools, such as Atlas, miro, empathy maps, PESTEL, insights, week signals, about the co-creation process, about the facilitation process, about teamwork. I learned about the importance of exploring, reflecting and thinking with other people, in different contexts, pedagogical, social and cultural, of different nationalities, such as with the facilitators, the workers of the partner entity, the colleagues in the different formations and meetings, but particularly in the internationalization immersion carried out in the six fantastic bootcamps with the presence of the four polytechnics involved and the facilitators, both Portuguese and Finnish, that allowed me to have this vision that I now have of what it is to participate in a bootcamp. (C.E., 5th batch, sic)*

The fact that the Demola Portugal Initiative offered synchronous and asynchronous training sessions, workshops/meetings with experts and the representatives of partner entities, as a platform for experiential learning, is regarded as beneficial by the participants, but **face-to-face bootcamps** are

highlighted as the key because of collective skill development and the sharing of best practices: “In my opinion, the presentational sessions – bootcamps – were much more interesting for facilitators. There it was possible to learn strategies and tools for group working” (G.F., 6th batch, sic). This sentiment resonates across other portfolios, where the acknowledgement of the digital realm’s vast opportunities is balanced with an appreciation of our fundamental need for in-person interactions as social beings. Numerous portfolios highlight the bootcamps as the pinnacle of their training journey. During these face-to-face and/or online sessions, the teaching staff, representing diverse fields of expertise and hailing from various Polytechnic Institutes in Portugal – and even from Finland (and one from Hungary) where the trainers came from – engaged in testing co-creation tools and approaches. As claimed by S.J., from the 5th batch:

*The future is already there, at the end of the avenue. Starting from current reality to project the future seemed to me to be a very interesting exercise. The opportunity (particularly in bootcamps, but also in online sessions) to do the analytical exercise of speculation that the What if... and How might we... questions, was very relevant to deepen the idea that more important than to arrive at immediate solutions is to co-create thought, developing hypotheses. (...) Technology allows us this marvel of having training in Portugal, from Finland. The online sessions were fundamental to sustain, both with theoretical foundations and with knowledge of techniques and tools, my facilitation practice. (S.J., 5th batch)*

The tools referenced by S.J. proved instrumental for all teams in redirecting their focus from fixed solutions to the exploration of opportunities, embracing setbacks as integral components of the learning process. Through the incorporation of methods such as affinity mapping, the ‘What if...?’ and ‘How might we...?’ design approaches, whose advantages are addressed and analysed by scholars such as Siemon, Becker and Robra-Bissantz (2018) and Vignoli et al. (2022), teams cultivated a mindset conducive to creativity and innovation.

Nevertheless, the pursuit of innovation is not without its challenges. A succinct reflection capturing some common concerns found across various e-portfolios revolves around dissatisfaction regarding partner entities. It was observed, in different instances, that **partner entities tended to overlook or dismiss** most – if not all – of the **ideas** presented by students:

*One of the least positive aspects was the relationship with the partner company. Despite always being interested in helping us, company representatives didn’t have much time available to meet with the team. When we asked them how the team could help with their ideas and contributions, the solutions they were looking for were different from those the team was able to provide. The organization’s problems were quite practical, while the ideas developed by the team were more theoretical. (D.A.S., 5th batch)*

This recurring theme highlights a crucial aspect of the collaborative process, indicating potential challenges in the implementation and recognition of student-generated ideas within external entities. This goes hand in hand with what Amante (2023) mentions when she addresses the common difficulties on the part of organisations to capitalise on the possibilities arising from ideas generated by students. Actually, the translation of their ideas into real-world organisational practices is frequently met with resistance, most often because the students do not have time to mature their ideas, or the skills needed. That is why most trainees/facilitators recognise the **significance of interdisciplinary and intercultural teams**, as this extract exemplifies:

*This methodology is similar to the Learin’s Creatin project that we implemented in IPV funded by FCT but it introduces the possible concept of an interdisciplinary team of students working in close collaboration with a company. Both methodologies require high dedication and autonomous work from students for which they are not trained/prepared. In our case, we follow the concept of interdisciplinarity of the students obtaining good results, therefore I propose to become mandatory to have an interdisciplinary team integrating at least (when possible) one foreign student. (O.S., 2nd batch, sic)*

Diverse teams, comprising students from different cultural backgrounds, bring forth a wealth of perspectives, experiences, and insights that collectively enrich a project's outcome. One of the trainees/facilitators points out another advantage: "The fact of having an international student Chinese forced me to overcome one of my weaknesses the language barrier" (G.D., 1st batch, sic), an aspect similarly emphasised by other participants. This initiative stressed the need for the teaching staff to **invest in the learning of foreign languages, particularly English**, for effective communication to take place, but despite the challenges encountered, fruitful collaboration was feasible:

Although initially fearful, due to my lack of expertise in the English language, I felt increasingly excited and confident, thanks to the feeling of understanding and inclusion present, that led me to invest not only in the development of the project idea I had, but also in English language training. (C.E., 5th batch)

The quotations above indicate that the teaching staff hold **a positive view regarding the "Aprendizagem com base em processos de cocriação" training** and believe it leads to a significant enhancement in teaching quality. Many more examples could be added, but let us conclude this section with a final excerpt that eloquently captures the main ideas of this study:

*This (long!) journey, often felt with discomfort, due to the low predictability and control (...), allowed the development/improvement of skills and learning.*

*From defining the challenge, to aligning to the partner's needs, to recruiting and building the team, to people, tools, through the training and facilitation process, the discoveries, insights, opinions, scenarios... it was indeed a period of great investment and with harvested fruits. I feel grateful for having embraced this challenge, for having withstood adversity, for the welcome and support of all involved, and above all, for all the moments when enthusiasm was visible in the twinkling of eyes and waving of hands! (B.A.A., 4th batch)*

## CONCLUSIONS

As the digital landscape evolves and academia evolves with it, programmes like the Demola Portugal Initiative stand at the forefront of pedagogical innovation and student empowerment in Portugal. They pioneer active methodologies, innovative pedagogical tools, and holistic learning experiences, aligning strongly with the needs of the contemporary labour market. By bridging gaps, promoting collaboration, and embracing innovative pedagogies, they inspire a dynamic learning environment. This environment nurtures critical thinking, fosters practical skills, and equips students for academic success and future professional endeavours. Moreover, this approach extends beyond classroom walls and textbook knowledge. It incorporates experiential learning in real-world contexts, often alongside intercultural peers in multidisciplinary teams, further enriching the educational experience.

These insights stem from the considerations in this study, which delved into the perspectives of teaching staff from the Polytechnic Institute of Viseu and 12 vocational school teachers from the region, engaged in the six editions of the Demola Portugal Initiative. The analysis of their e-portfolios revealed common themes. Findings indicate that participants are embracing this paradigm shift and valuing their role as facilitators. They feel compelled to invest in ongoing professional development to act as architects of a new era in education. In their portfolios, almost all IPV members and vocational school teachers expressed this compelling drive to periodically engage in training. This includes immersive bootcamps, face-to-face workshops, and other events to prepare them to use novel pedagogical tools, ensuring alignment with educational innovation and evolving pedagogical methodologies.

This initiative (2021-2023) not only provided the teaching staff with tools to strive for pedagogical excellence, but it also empowered students to actively shape their own destinies. Therefore, it can be asserted that familiarising oneself with programmes such as the Demola Portugal Initiative may hold implications for transforming and improving teaching quality across various educational levels and contexts. Actually, this initiative serves as a model that can inspire similar endeavours globally, akin to the one previously described by Catalá-Perez et al. (2020) in Spain. It bears the potential for ramifications that extend beyond its immediate scope, with far-reaching consequences to the advancement of teaching methodologies and the overall educational quality. The Demola Portugal Initiative has the capacity to leave a lasting imprint on other national and international educational settings.

In conclusion, our study highlights the significance of programmes like the Demola Portugal Initiative in fostering pedagogical innovation and improving educational standards. However, it is crucial to acknowledge the existence of certain inherent limitations. Notably, some participants in the programme exhibited some resistance, a topic deserving attention. This resistance may arise from various factors, such as time constraints or reluctance from collaborating organisations and students. Addressing these concerns surrounding initial setbacks or uncertainties regarding the effectiveness of proposed changes is essential. Effective communication, providing a rationale for change, offering support, and highlighting the benefits of pedagogical innovation can all play crucial roles in mitigating resistance, as evidenced by testimonials. In addition to these acknowledged limitations, it is essential to recognise that our findings, while insightful, are constrained within the regional context of Viseu. Hence, caution must be exercised in extrapolating these results beyond this specific setting. Moreover, to comprehensively assess the initiative's impact on the pedagogical practices of professors at the Polytechnic Institute of Viseu, future research directions should focus on exploring changes implemented at an institutional level. This entails examining whether the Polytechnic Institute of Viseu is currently integrating challenge-based approaches, co-creation methods, and exploring platforms and tools that facilitate active pedagogies. Such an in-depth investigation would offer nuanced insights into how the initiative has influenced and potentially transformed the pedagogical approaches adopted by IPV professors. Furthermore, it would contribute significantly to the broader discourse on pedagogical innovation in Higher Education. By delving into institutional changes and practices, future research can provide valuable insights that inform policy decisions and educational practices beyond the confines of our current study.

## REFERENCES

- Amante, F.S. (2023). 'Now Open for Action!' – A Real-World Challenge Project Developed at the Polytechnic Institute of Viseu. *Social Sciences Humanities Open* 8(1). <https://doi.org/10.1016/j.ssaho.2023.100729>
- Amante, S. (2021). Building Translation Competence through Portfolios at Undergraduate Level – Reflections on a Practical Approach to Subtitling. *Athens Journal of Philology*, 8(2), pp. 97-116. <https://doi.org/10.30958/ajp.8-2-1>
- Amante, S., Antunes, M.J., Dygala, M., & Gökçe, I. (2021). Stepping up to Global Challenges (SGC): Empowering Students across the World. *Psychology of Language and Communication*, 25, 217–239. <https://doi.org/10.2478/plc-2021-0010>
- Amante, S., & Fernandes, R. (2023). Aligning HE Pedagogical Innovation with VET, Industry, and Research Partnerships: Insights on the Demola Portugal Initiative. *Education Sciences*, 13, 93. <https://doi.org/10.3390/educsci13010093>
- Amante, S., & Fernandes, R. (2022). Learning based on co-creation processes: a glimpse of the (Demola) Pedagogical Innovation Training course at IPV In Sklias, P., and Apostolopoulos, N. (Eds.). *Proceedings of the 17<sup>th</sup> European Conference on Innovation and Entrepreneurship*, 17(1), pp. 15-21. <https://doi.org/10.34190/ecie.17.1.306>

- Antunes, F. (2012). ‘Tuning’ Education for the Market in ‘Europe’? Qualifications, Competences and Learning Outcomes: Reform and Action on the Shop Floor. *European Educational Research Journal*, 11(3), pp. 446-470. <https://doi.org/10.2304/eerj.2012.11.3.446>
- Avsec, S., & Savec, V. (2022). Mapping the Relationships between Self-Directed Learning and Design Thinking in Pre-Service Science and Technology Teachers. *Sustainability*, 14(14), pp. 1-28. <https://doi.org/10.3390/su14148626>
- Bauman, A. (2018). Concept Maps: Active Learning Assessment Tool in a Strategic Management Capstone Class. *College Teaching*, 66(4), 213–221. <https://doi.org/10.1080/87567555.2018.1501656>
- Bertran, F., Pometko, A., Gupta, M., Wilcox, L., Banerjee, R., & Isbister, K. (2022). Designerly tele-experiences: a new approach to remote yet still situated co-design. *ACM Transactions on Computer-Human Interaction*, 29(5). <https://doi.org/10.1145/3506698>
- Catalá-Perez, D., Rask, M. & Miguel-Molina, M. (2020). The Demola model as a public tool boosting collaboration in innovation: a comparative study between Finland and Spain. *Technology in Society*, 63, 101358. <https://doi.org/10.1016/j.techsoc.2020.101358>
- Chhabra, S., & Ambreen, L. (2021). Comprehending Entrepreneurship Learning Through the Lens of Innovative Teaching Pedagogy: India Vs Germany. *Proceedings of the European Conference on E-Learning, ECEL 2021*, pp. 98-104. <https://doi.org/10.34190/EEL.21.089>
- Chinn, C., & Iordanou, K. (2023). Theories of Learning. In Lederman, N., Zeidler, D., Lederman, J. (Eds.). *Handbook of Research on Science Education*, Vol. 3. New York: Routledge, pp. 89-120. <https://doi.org/10.4324/9780367855758-6>
- Demola Global. 2023a. Demola in numbers. Available online at <https://www.demola.net/media>, on August 11, 2023.
- Demola Global. 2023b. For Students. Available online at <https://portugal.demola.net/students>.
- Fernandes, R., & Amante, S. (2022). From Teachers’ Innovative Practices to Students’ Co-Creation: A Glimpse of the Project “Link Me Up—1000 Ideias”. In Sklias, P., and Apostolopoulos, N. (Eds.). *Proceedings of the 17th European Conference on Innovation and Entrepreneurship*, 17(1), pp. 226–231. <https://doi.org/10.34190/ecie.17.1.396>
- Fuad, D., Musa, K., & Hashim, Z. (2022). Innovation Culture in Education: A Systematic Review of the Literature. *Management in Education*, 36(3), pp. 135-149. <https://doi.org/10.1177/0892020620959760>
- Gelo, O., Braakmann, D., & Benetka, G. (2008). Quantitative and qualitative research: Beyond the debate. *Integrated Psychological Behavior*, 42(3), pp. 266-290. <https://doi.org/10.1007/s12124-008-9078-3>
- Hass, A., Laverie, D. A., & Cours Anderson, K. (2020). “Let’s be independent together”: Enabling Student Autonomy with Team Based Learning Activities in a Flipped Class. *Marketing Education Review*, 31(2), pp. 147–153. <https://doi.org/10.1080/10528008.2020.1853572>
- Herodotou, C., Sharples, M., Gaved, M., Kukulska-Hulme, A., Rienties, B., Scanlon, E., & Whitelock, D. (2019). Innovative Pedagogies of the Future: An Evidence-Based Selection. *Frontiers in Education*, 4. <https://doi.org/10.3389/educ.2019.00113>
- Kilamo, T., Hammouda, I., Kairamo, V., Räsänen, P., Saarinen, J.P. (2011). Applying Open Source Practices and Principles in Open Innovation: The Case of the Demola Platform. In Hissam, S.A., Russo, B., de Mendonça Neto, M.G., Kon, F. (eds). *Open Source Systems: Grounding Research. OSS 2011. IFIP Advances in Information and Communication Technology*, vol. 365. Springer, Berlin, Heidelberg. [https://doi.org/10.1007/978-3-642-24418-6\\_22](https://doi.org/10.1007/978-3-642-24418-6_22)
- Konstantinou, E., Nachbagauer, A., & Wehnes, H. (2023). Editorial: Digital learning and education in a project society. *Project Leadership and Society*, 4, 100083. <https://doi.org/10.1016/j.plas.2023.100083>
- Koria, M., Osorno-Hinojosa, R., Ramírez-Vázquez, D., & van den Broek, A. (2022). One World, Two Ideas and Three Adaptations: Innovation Intermediaries Enabling Sustainable Open Innovation in University-Industry Collaboration in Finland, Mexico and Nicaragua. *Sustainability*, 14, 11270, pp. 1-18. <https://doi.org/10.3390/su141811270>

- Kurvits, M., Laanpere, M., Väljataga, T., & Robtsenkov, R. (2019). Visualising and Re-using Innovative Pedagogical Scenarios. In Herzog, M. A., Kubincová, Z., Han, P., & Temperini, M. (Eds.). *Advances in Web-Based Learning – ICWL 2019. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Vol. 11841 LNCS, Cham: Springer, pp. 177-189. [https://doi.org/10.1007/978-3-030-35758-0\\_17](https://doi.org/10.1007/978-3-030-35758-0_17)
- Lambriex, P., Van der Klink, M., Beusaert, S., Bijker, M., & Segers, M. (2020). When Innovation in Education Works: Stimulating Teachers' Innovative Work Behaviour. *International Journal of Training and Development*, 24(2), pp. 118-134, <https://doi.org/10.1111/ijtd.12175>
- Mantelet, F., Segonds, F., & Jean, C. (2018). Additive Creativity: An Innovative Way to Enhance Manufacturing Engineering Education. *International Journal of Engineering Education*, 34(6), pp. 1776-1784.
- Mercat, C. (2022). Introduction to Active Learning Techniques. *Open Education Studies*, 4(1), pp. 161-172. <https://doi.org/10.1515/edu-2022-0010>
- Nani, G.V., & Ndlovu, I. (2022). Survival of the Fittest. How Small and Medium Enterprises (SMES) in the Bulawayo Metropolitan Province, Zimbabwe, Experienced the Covid-19 Pandemic. *Journal of Global Business and Technology*, 18(1), pp. 56-70.
- Rodrigues, S., & Mourato, J. (2023). *The impact of HEIs on Regional Development: Facts and practices of collaborative work with SMEs*. IGI Global. <https://doi.org/10.4018/978-1-6684-6701-5>
- Salim, M., Saad, M., & Nor, B. (2021). Comparative Study of Low-Cost Tools to Create Effective Educational Infographics Content. *11<sup>th</sup> IEEE International Conference on Control System, Computing and Engineering (ICCSCE 2021)*, Penang, Malaysia, pp. 23-28. <https://doi.org/10.1109/ICCSCE52189.2021.9530848>
- Siemon, D., Becker, F. & Robra-Bissantz, S. (2018). How might we? From design challenges to business innovation. *Innovation*, 4. Retrieved from <http://www.journalcbi.com/from-design-challenges-to-business-innovation.html>
- Songkram, N., & Chootongchai, S. (2020). Effects of Pedagogy and Information Technology Utilization on Innovation Creation by SECI Model. *Education and Information Technology*, 25, pp. 4297–4315. <https://doi.org/10.1007/s10639-020-10150-2>
- Suoheimo, M., & Määttä, K. (2024). Service Design Thinking Method for Educational Leaders. In Ahtiainen, R., Hanhimäki, E., Leinonen, J., Risku, M., Smeds-Nylund, AS. (eds). *Leadership in Educational Contexts in Finland*. Educational Governance Research, vol 23. Springer, Cham. pp. 81-100. [https://doi.org/10.1007/978-3-031-37604-7\\_5](https://doi.org/10.1007/978-3-031-37604-7_5)
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting qualitative descriptive study. *Journal of Nursing & Health Sciences*, 15(3), pp. 398-405. <https://doi.org/10.1111/nhs.12048>
- Vignoli, M., Roversi, S., Jatwani, C., Tiriduzzi, M., & Finoccki, C. (2022). Evolving the "How Might We?" Tool to Include Planetary Boundaries. *Proceedings of the Design Society*, 2, pp. 1159-1168. <https://doi.org/10.1017/pds.2022.118>
- Winch, G., Cao, D., Maytorena-Sanchez, E., Pinto, J., Sergeeva, N., & Zhang, S. (2021). Operation Warp Speed: Projects Responding to the COVID-19 Pandemic. *Project Leadership and Society*, 2, 100019. <https://doi.org/10.1016/j.plas.2021.100019>