



UNIVERSITIES AND SECONDARY SCHOOLS TEAMING
UP FOR A DIFFERENT ENTREPRENEURSHIP EDUCATION:
BARRIERS, ENABLERS, AND OUTCOMES OF AN OPEN AND
COLLABORATIVE PROCESS TO
CO-DESIGN ENTREPRENEURIAL COMPETENCES DEVELOPING
EXPERIENTIAL LEARNING ACTIVITIES

Leandro Bitetti

*Scuola universitaria professionale
della Svizzera italiana
leandro.bitetti@supsi.ch*

Andrea Huber

*Scuola universitaria professionale
della Svizzera italiana
andrea.huber@supsi.ch*

Article info

Date of receipt: 26/04/2021
Acceptance date: 18/10/2023

Keywords: university-school
collaboration, entrepreneurial
competences, action research

doi: 10.14596/pisb.2860

Abstract

Purpose. This study explores the collaboration between universities and secondary schools in co-designing experiential learning activities for fostering entrepreneurial competences applying the EU Entrepreneurship Competence Framework. **Methodology.** Participatory action research involved sixty secondary school teachers from Italy and Switzerland. **Findings.** The study reveals barriers (lack of strategy, collaboration ecosystem, and competence monitoring), enablers (active tutoring, shared language, and digital technologies), and outcomes (teacher, learner, and bridging school-job gap). **Practical and social implications.** This study contributes a process framework for collaborative innovation between universities and secondary schools, informing the design of effective entrepreneurship education programs. **Originality.** The study is among the first to adopt a collaborative rather than a complementary view of universities and secondary schools in the development of entrepreneurship education.

1. Introduction

In an increasingly complex, dynamic and uncertain world, where different challenges (such as technological, social, environmental, political, economic, etc.) are in a continuous transformation, an entrepreneurial society may represent a powerful collective answer (Audretsch, 2009; Hoppe & Namdar, 2023). The introduction of the EU EntreComp framework (European Commission, 2018) highlights the EU's commitment to defining and promoting entrepreneurial skills. In fact, the Council of the European Union, in its recommendation on key competences for lifelong learning, laid out on 22 May 2018, underlines the need for member states to nurture entrepreneurial competences. Entrepreneurial competencies are defined as a combination of knowledge, skills, and attitudes that are particularly needed to identify and exploit entrepreneurial opportunities (Mitchellmore and Rowley, 2010). A relevant integration of this recommendation is about exploring the role of (1) universities, and (2) primary and secondary schools in entrepreneurship education. In fact, cases of entrepreneurship education at any level of education have become more common and researched over the past few years (Brüne & Lutz, 2020; Fejes et al., 2019; Hoppe, 2016; Kirkley, 2017). However, most studies focus on these two actors separately. The recent literature on entrepreneurship education in universities assessed the challenges and opportunities of entrepreneurship education (Hameed & Irfan, 2019; Liguori & Winkler, 2020), and the impact of entrepreneurship education on university students' entrepreneurial skills and entrepreneurial intention (Hahn et al., 2020; Jena, 2020). As entrepreneurship education has entered the curriculum of primary and secondary schools, extant literature has focused on the contents of such programs - presenting cases, best practices and policy implications (Dorji, 2021; Floris & Pillitu, 2019; Kilar & Rachwał 2019; Toutain et al., 2019). This brings out two main research gaps. Firstly, we found no previous studies that aim at understanding the barriers, the enablers, and the impact/outcome of the process of developing educational content that fosters entrepreneurial competences in pupils. Secondly, most studies consider universities and primary and secondary schools as independent actors in entrepreneurship education (Brüne & Lutz, 2020; Jardim et al., 2021). Therefore, we found that little attention has been paid to the collaboration between universities and schools to co-design educational activities that foster entrepreneurial competences.

Consequently, our research question is twofold: "(1) how do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils' entrepreneurship competences?; and (2) how do barriers, enablers, and impact/outcomes influence this co-design process?". Our study explores the barriers, the enablers, and the outcomes of

the co-design process that we ran with sixty secondary school teachers (i.e., who teach 11–15-years-old pupils), with the specific goal to co-develop a concrete educational activity that stimulates the development of entrepreneurial competences. Our approach does not focus on teaching pupils how to start a company. Instead, we aim to develop experiential learning activities to help them develop the skills required to act as entrepreneurs and promote enterprising behavior (Edwards-Schachter *et al.*, 2015; Fayolle *et al.*, 2006). Drawing upon recent research, it is evident that leveraging experiential learning in entrepreneurship education proves to be a potent tool for designing effective entrepreneurship education programs (Cerquetti *et al.*, 2021; Hahn *et al.*, 2021). The need to develop entrepreneurship competences is highlighted by the recent trend of the gig economy, and the rise of digital business models such as Uber or Airbnb - which are producing new forms of entrepreneurship. An Uber driver or an Airbnb host needs to master entrepreneurship competences even if they do not own the company. Similarly, the employees are also requested to be more proactive in innovation activities. Recent innovation approaches, such as the lean startup, innovation labs, corporate acceleration and incubation programs give space to employees to act as corporate entrepreneurs or intrapreneurs (Honig, 2001; Martiarena, 2013). Therefore, teaching entrepreneurship at universities is not enough anymore. As some countries have established that entrepreneurship education must be present at the upper secondary level (Fejes *et al.*, 2019), we argue that keeping in mind the COVID-19 crisis, entrepreneurship competences should be trained and developed during lower secondary education. This does not mean the curriculum must create a new subject called “entrepreneurship”; rather, it implies that all teachers, regardless of the discipline taught, should rethink their curriculum in order to develop entrepreneurial competences, as well as the most technical and subject-related skills. Rather than being a challenge, this represents an opportunity for entrepreneurship scholars to help and transfer their knowledge, that could be matched with the expertise of the teacher and his or her technical knowledge of the subject taught. The present study aims to contribute to the entrepreneurship education literature and policy by exploring new opportunities for collaboration between universities and secondary schools, in order to co-design curricular activities that foster entrepreneurial competences.

In the remainder of the article, we review the relevant literature, present our experience of the course where we applied the EU EntreComp framework within a backward instructional design model, and also present our results. At the same time, we discuss how to enhance the collaboration between universities and secondary schools in order to improve the development of entrepreneurial competences for pupils.

2. Theoretical background

In our study, we aim to use the concept of open and collaborative innovation applied to entrepreneurial education. In fact, we merge two literature streams, which may shed new light on how to improve entrepreneurship education, both theoretically and in practice. We refer to entrepreneurial competences and open and collaborative innovation. We found a connecting gap between these two themes that we aim at addressing in our study.

2.1 Entrepreneurial competences according to *EntreComp* Framework

Entrepreneurial competencies encompass a comprehensive spectrum of knowledge, skills, and attitudes that serve as the fundamental pillars for initiating or expanding a business venture (Mitchelmore and Rowley, 2010). Entrepreneurial competences are present in the different aspects of entrepreneurship, which has become a multifaceted and interdisciplinary topic for scholars. Some researchers are interested in the entrepreneurial process and its relative challenges (Bitetti, 2022; Dimov and Pistrui, 2020; Venkataraman, 1997). Others focus on the role of the entrepreneur, its cognition and behavior (Bitetti and Gibbert, 2022; Caputo and Pellegrini, 2020; Mitchell *et al.*, 2014). Moreover, scholars are increasingly considering entrepreneurship an academic and teachable subject (Henry *et al.*, 2005; Neck *et al.*, 2014; Rasmussen and Sørheim, 2006). Nevertheless, these approaches mainly consider entrepreneurship as the creation of a new organization. Contrariwise, the present study adopts the view of entrepreneurship as a mindset (Morris *et al.*, 2013). In this field, Cubico *et al.* (2010) developed “the entrepreneurial aptitude test” to determine the profile of entrepreneurs. Further, the literature on entrepreneurial thinking and learning complements other elements that are important in educational programs to develop better entrepreneurial minds (Cope, 2005; Corbett, 2007; Krueger, 2007; Peris-Ortiz *et al.*, 2014; Politis, 2005). More recently, literature on entrepreneurship mindset has revealed the importance of the development of entrepreneurship competences for the growth and innovativeness of countries (Kuratko and Morris, 2019).

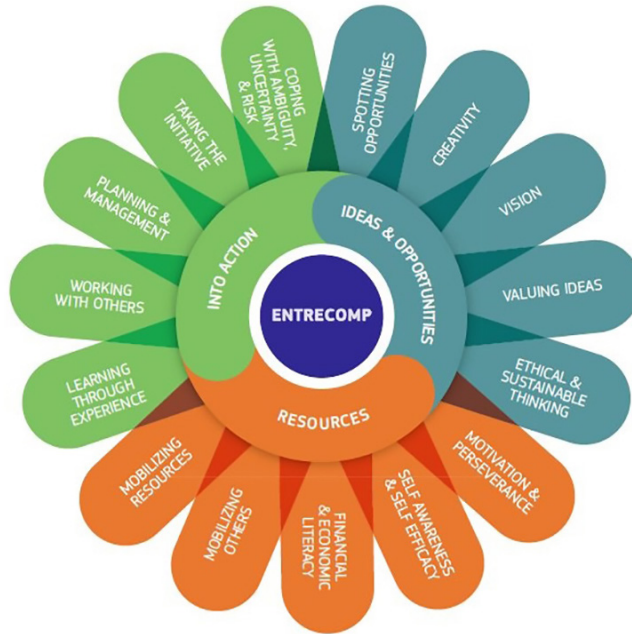
Entrepreneurial competences are assessed under different theoretical lenses, such as psychological traits theory, behavioral theories, and social cognitive theory (Edwards-Schachter *et al.*, 2015). Entrepreneurial intentions are shaped by a combination of individual personality traits, such as attitude towards entrepreneurship and self-efficacy, as well as situational factors, including educational and social context, and personal background (Gabbianelli *et al.*, 2021; Hussein *et al.*, 2021; Sedita and Blasi, 2021). However, the good news is that competences can be developed through training (Mwasalwiba, 2010). In Europe, there are already many practices aimed at developing entrepreneurship competences (European Commission, 2016).

However, Giancesini *et al.* (2018) assessed different entrepreneurial competences models and identified the core personality variables, entrepreneurial knowledge, and skills that compose a meta-competence on entrepreneurship. Moreover, Cubico and Favretto (2018) emphasize the value of education to develop such entrepreneurial competences.

Among practices aimed at developing entrepreneurship competencies, one relevant model is the EU Entrepreneurship Competence (EntreComp) Framework (Bacigalupo *et al.*, 2016). Figure 1 shows the components of the EntreComp Framework, which is the reference model for our study. The Framework suggests that entrepreneurial competences involve the ability to transform ideas and opportunities into action, by mobilizing resources. EntreComp is more than a list of competences. EntreComp is a set of cognitive and practical tools for all people interested in learning, teaching and coaching the knowledge, skills and behaviors that portray the entrepreneurial spirit. EntreComp's three main areas (i.e., Ideas & Opportunities, Resources, and Into action) are divided into five competences, that together form the fifteen key entrepreneurship competences. In the EntreComp Framework, there is no hierarchy among competences, as all of them are important and it is recommended to apply the competences flexibly to be adapted to the specific context. Many communities around the world have emerged to spread and apply to EntreComp Framework, accordingly to the state of the art of entrepreneurship education literature. In particular, Edwards-Schachter *et al.* (2015) determine three educational approaches to developing entrepreneurial competences: (1) content-driven education; (2) exposure to entrepreneurs and their role; and (3) action-based and experiential learning, which is at the core of our approach. Moreover, Cerquetti *et al.* (2021) assessed that the "IMpresa INaula" training programme solidifies the notion that engaging in experiential learning activities has a positive impact on fostering openness, confidence, and trust among students, in contrast with those who do not participate in experiential learning activities.

Nevertheless, despite the clustering of different entrepreneurship education approaches, there is still a general lack of understanding on how to develop effective experiential learning - and more precisely, in secondary education. This builds on the relevant poor knowledge about the role of teachers in entrepreneurship education, especially when it comes to entrepreneurial competences development. Although a few cases of playbooks and frameworks exist (Bacigalupo *et al.*, 2020; Grigg, 2020), there is still a general need to systematize the efforts and make them consistent with the pedagogical goals of the single subject taught by the teacher. In practice, finding spots in secondary schools' timetables is difficult. Therefore, instead of adding activities, reflection should be more about how to revise the current ones in order to develop entrepreneurial competences, by also favoring student centrality in entrepreneurship education (Aparicio *et al.*, 2019).

Fig. 1. *EntreComp Framework*



Source: *European Commission (2018)*

Gibb (2011) determines that teachers are relevant to develop entrepreneurial competences, especially those who personally possess entrepreneurial competences (Peltonen, 2015). However, García *et al.* (2017) assert that teachers and pupils cannot achieve these results without interacting with other actors, such as universities. In contrast, outsourcing entrepreneurship competence-developing activities to entrepreneurship scholars is not a very effective strategy. This is because pupils build a relationship with their teachers, which facilitates learning (Bressoux and Bianco, 2004).

2.2 Open and collaborative innovation in school contexts: co-creation and co-design approaches

Open and collaborative innovation refers to a paradigm shift in the traditional model of innovation that has typically been driven by a single organization or firm developing innovation in isolation (Chesbrough, 2003). Instead, open and collaborative innovation involves seeking input, knowledge, and resources from a diverse group of individuals and organizations - both within and outside the firm boundaries, in order to co-create and bring new ideas to the market (von Hippel, 2005). This lens extends

beyond the scope of businesses and encompasses collaboration for innovation within the school context. For instance, certain collaborative initiatives, such as providing teachers with opportunities to serve as visiting lecturers at universities, have proven highly effective in facilitating their professional development (Perry et al., 1998), as well as the substantial impact of university faculty on educational reforms in secondary schools (Kersh and Masztal, 1998).

This concept originated in the early 2000s and has gained increased attention in recent years due to the growing recognition of the benefits of tapping into a wider pool of knowledge and expertise to drive innovation. The importance of open and collaborative innovation lies in its ability to leverage the collective intelligence and diversity of perspectives of a broad range of stakeholders, which can lead to more creative and impactful solutions (von Hippel, 2005) as well as reducing the risk of false positives and false negatives when it comes to an innovative solution (Chesbrough, 2004). In fact, by working together, organizations and individuals can share risks and resources, leading to more efficient and effective use of resources and a faster pace of innovation (West & Bogers, 2014). Open and collaborative innovation is usually applied through a variety of mechanisms, such as open innovation challenges, crowdsourcing, and open-source initiatives (Chesbrough, 2003). These approaches involve actively engaging with external stakeholders and tapping into their expertise, knowledge, and networks to drive innovation (Lakhani & von Hippel, 2004). Innovation is increasingly considered a collaborative process involving multiple actors (Etzkowitz and Leydesdorff, 2000). Carayannis and Campbell (2009) developed the Quadruple Helix approach, highlighting the importance of the culture-based public and civil society as additional actors to complement the relations between universities, industry, and governments (Etzkowitz and Leydesdorff, 1995). Although open and collaborative innovation mainly originates in the business and corporate contexts (Van der Meer, 2007), in the context of entrepreneurial education, open and collaborative innovation can play a critical role in supporting the development of new ventures and businesses (Bissola et al., 2017; Iglesias-Sánchez et al., 2019; Wyncarczyk et al., 2013). By involving students, faculty, alumni, and industry experts in the entrepreneurial process, educational institutions can create a dynamic and inclusive environment that fosters creativity, innovation, and entrepreneurial thinking. This means that for example, universities can organize hackathons and startup competitions that bring together students, alumni, and industry experts to co-create and develop new ideas and businesses. They can also provide students with opportunities to work on real-world projects with companies and organizations, providing them with hands-on experience and access to a network of potential partners and collaborators. Further, these opportunities are strongly linked to the call for universities

to their “third mission” about contributing to the socio-economic development of the territory (Colasanti et al., 2017).

The collaboration for innovation between universities and secondary schools is not an entirely new topic. The university faculty has a significant role in the educational reforms of secondary schools (Kersh and Maszta, 1998). Some initiatives of collaboration comprise giving teachers the chance to be visiting lecturers at a university and have been particularly effective in achieving professional development (Perry *et al.*, 1998). Nevertheless, scant attention has been given to the curriculum co-design opportunities for collaboration. Sanders and Stappers (2008) define co-design as creative cooperation during design processes. The broader concept of co-creation is particularly relevant in the field of innovation management (Gemser and Perks, 2015; Romero and Molina, 2011) as well as marketing (Cova *et al.*, 2011; Grönroos, 2011), but we found no literature about co-creation processes within universities and schools. In general, value co-creation sessions are seen as a win-win strategy for all parts (Martinez, 2014) and the poor attention given to co-creation in educational settings stimulated our reasoning.

Putting all these considerations into the education sector, we see that the same may apply to innovation activities for schools and universities. Usually, designing new educational activities involves members of the same community only. Many lecturers already have formal or informal exchanges with people outside their context in order to broaden their horizons. Nevertheless, a structured collaboration in which each involved actor brings his or her own expertise and ideas with the goal of generating higher value is currently under-investigated. In our study, we take the angle of considering secondary schools as focal organizations and we observe and assess how the opening of secondary schools to universities as external actors may help in the development of innovation (i.e., new courses and pedagogical activities that develop entrepreneurial competences). Therefore, we adopted an approach of “teaching the teacher,” who will then act as an enabler of entrepreneurship competences development with their pupils.

3. Methodology

The research questions of the present study are “(1) how do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils’ entrepreneurship competences; and (2) how do barriers, enablers, and impact/outcomes influence this co-design process?”. Given the novelty of the topic and the opportunity to work with secondary school teachers in a large applied research project between Switzerland and Italy, we adopted an action research methodology. Action research is a cyclical and reflective process that enables researchers to work

collaboratively with participants to identify and solve educational problems (Creswell et al., 2011). As Greenwood and Levin (2006) describe, action research is a methodology where researchers aim at solving practical problems while reflecting on and studying a research topic with the goal of generating new knowledge.

Our study utilized a participatory action research design, which involves a collaborative effort between the researcher and the participants to co-create knowledge (Carr & Kemmis, 1986). The participants in this study were 60 secondary school teachers, spread in the regions of Piedmont, and Lombardy, in Italy, and in the Italian-speaking part of Switzerland (i.e., Ticino). The teachers were selected based on their interest in including entrepreneurial competences development in their courses, and their willingness to participate in the action research process that lasted three years. The selection was helped by the chambers of commerce that linked the researchers of the present study to different schools in the area.

As is customary, the action research process consisted of four stages: (1) problem identification, (2) planning, (3) implementation, and (4) evaluation (Casey, 2013; Kemmis *et al.*, 2013). During the problem identification stage, the researchers worked with 60 teachers and education leaders in Switzerland and in the Northern part of Italy to identify the need for developing entrepreneurial competences. In this stage, we run five workshops to capture the need of the teachers and schools' directors in order to design a course to co-develop some activities that enhance the entrepreneurial competences of pupils.

In the planning stage, the researchers and the participants had a series of sessions to design pedagogical activities that develop entrepreneurial competences. In practice, we develop a course that we replicated 8 times in different geographical areas. The course entailed four lectures in a workshop setting. The first lecture consisted of an introduction to entrepreneurship and a role-playing exercise to trial a possible activity. We provided an introduction to what being an entrepreneur means today. The main goal was to overcome preconceptions on entrepreneurship that teachers with a non-business background may have had, such as that entrepreneurship only means founding a start-up, or that entrepreneurship means working with technology or building huge firms. The role-play was about solving a practical problem about how to reduce congestion through alternative mobility. We provided some cards containing the needs of the companies, workers, and society, along with some global trends and existing solutions. Teachers played the role of students and we acted as teachers in order to experience a possible situation. The second lecture was about the choice of the core entrepreneurial competences to be developed through the activity. To guide this activity, we used the EntreComp Framework and applied it as an example to a previous experience in the context of an activity on

the topic of reducing food waste. The third and fourth lectures involved planning the activities and some peer discussion. We facilitated the sessions and acted as mentors for designing the activities. The educational activities developed had to be designed to favor an experiential approach, as these are more effective in the development of entrepreneurial competences (Cesaroni and Sentuti, 2014; Fayolle, 2013). Given that the goal of the course was to co-design some teaching activities to develop entrepreneurship competences with teachers of any subject, we adopted the backward instructional design model (Wiggins and McTighe, 1998). This model is considered as a proper approach in competence-based education (Bitetti, 2019). The backward design starts with the identification of the core competences to develop far before the planning of the contents of the activity (Wiggins and McTighe, 1998). Research has shown that the backward instructional design model can be an effective approach for developing educational content and is widely used and recommended in educational settings (Dick et al., 2015; Morrison et al., 2004). For example, Leupen et al. (2019) assert that using backward design resulted in better alignment between learning outcomes, instruction, and assessments – as compared to using a traditional approach. Kim and Hannafin (2011) found that using backward design enhances relevant and meaningful instruction to learners. The authors suggest that starting with learning outcomes can help teachers to focus on what their pupils need to know and be able to do, rather than simply covering content. Given that determining appropriate learning outcomes and assessments may be a particularly difficult and time-consuming process (Hmelo-Silver and Barrows, 2006), the reference framework of *EntreComp* was particularly effective in limiting the options for participants. We proposed to the teachers a template to guide the co-design process. In this template, the following questions and themes were present: (1) The context and the constraints of the activity (i.e., subject taught; the number of pupils participating in the activity; the time at disposition to run the activity); (2) The target entrepreneurial competences (from *EntreComp*); (3) The pre-requisites in terms of knowledge and skills; (4) Some key questions to guide the activity; (5) The challenge/situation provided to the pupils; (6) How to assess the pupils; and (7) detailed step-by-step planning of the activity, including the implementation plan.

The implementation stage involved the delivery of the activity and data collection. Not every one of the 60 teachers was able to implement the activity in full, but all of them initiated it. During the implementation, teachers acted as facilitators, who are often forgotten by entrepreneurship education literature (Jones and Underwood, 2017). The limited studies on the role of educators in promoting entrepreneurship education are mainly focused on their perceptions (Teerijoki and Murdock, 2014), attitude (Peltonen, 2008), creativity (Wibowo and Saptono, 2018), entrepreneurial be-

havior (Joensuu-Salo et al., 2020), and experiences (Diegoli and Gutierrez, 2018). We also collected information about the negative experiences for the final stage of evaluation.

In practice, the participants co-designed a potential activity to be implemented in their classes the next semester with us. Three exemplary projects are described next. First, a geography lecturer with a passion for social media designed an experiential learning path to deepen the knowledge of the region (in this case, the Italian-speaking part of Switzerland). The idea was the creation of a social media-protected profile where the lecturer and his pupils had to publish content linked to the knowledge of the local region and its characteristics. Pupils had the chance to experiment with the safe usage of digital tools within the digital society, while at the same time being at the center of their learning. The structure of the activity included the active participation of pupils and a competitive approach. In fact, the activity involved gamification techniques (i.e., the use of typical concepts and methods of gaming, fostering experiential learning and active involvement). The pupils, via the ideation and the design of challenges, quizzes, games, etc. had the chance to explore, know, and deepen knowledge about where they live in terms of economic activities as well as socio-demographical, environmental, and artistic factors. Second, three mathematics teachers together developed a project that asked students to transform an unexploited room into something important for all pupils of the school. Pupils first had to explore and assess different exploitation options through surveys and interviews. Besides some mathematics, statistics, and geometry skills, pupils also developed several significant entrepreneurial competences in customer-orientation. Moreover, they also had to think about investments, operating costs, and the governance of the room. An interesting element of the activity involved the fact that it ran over two different academic years. The first year was about the analysis of the room, while the second was about the testing and implementation. Third, a robotics lecturer developed an activity in which students had to develop a prototype of a robot able to sort objects in different locations. Pupils did not only focus on the technological aspects of the robot but needed to study business concepts by analyzing macro trends and defining the value proposition, customer journey and uniqueness of the product. These reflections conducted the development of a Minimum Viable Product (MVP), to be tested with the target market in order to understand if a real interest exists and, if so, in which market.

In the evaluation stage, the researchers and the teachers reflected on the results and made changes to the co-design process based on their findings.

3.1 Data collection and analysis

We conducted a comprehensive approach to gather rich and diverse insights into the study. The data collection process involved multiple methods, including diaries, reflective analysis, semi-structured individual and group interviews with the teachers, and observations during the implementation stage.

During the problem identification and planning stages, we developed a set of guiding questions for our reflective analysis and wrote the answers in a diary after every session with the teachers. After each session with the teachers, we carefully documented our activities, participants' behaviors, encountered challenges, positive aspects, key learnings, and potential changes for the subsequent sessions. We described accurately (1) what we did in the session; (2) what participants did and how they behaved; (3) the positive aspects we encountered; (4) the critical issues we encountered; (5) the main learnings we had; and (6) what changes would be required in the next session.

To enhance the credibility of our findings, we employed triangulation by incorporating multiple sources of data. In addition to the diary entries and reflective analysis, we conducted semi-structured interviews with the teachers. These interviews served as primary sources of information, allowing us to gather in-depth insights and interpretations directly from the participants. To ensure a thorough understanding of the teachers' experiences and perspectives, we conducted both individual and group interviews. To begin with, we conducted a total of 60 individual interviews, each lasting approximately 30 minutes, with all the teachers involved in the course. These interviews provided us with valuable one-on-one interactions, allowing us to delve into the teachers' personal experiences, perspectives, and perceptions related to the course and its contents. The individual interviews served as a foundation for understanding the participants' unique insights and uncovering nuanced details that may not have emerged in a group setting, especially concerning the personal project developed by the teacher. Following the individual interviews, we further expanded our data collection efforts by conducting four group interviews. These group interviews specifically targeted teachers from the same region, providing an opportunity for collaborative discussion and the exploration of shared experiences. Group interviews allowed us to tap into the collective knowledge of teachers, uncovering common themes, patterns, and regional perspectives regarding the course. This is particularly relevant as the education system is slightly different among the different regions, especially between Switzerland and Italy. Therefore, by conducting group interviews, we aimed to gather additional information and insights that may have been influenced by the collective dynamics and shared context among the

participants. These group interviews facilitated rich discussions, allowing participants to build upon and challenge each other's ideas, fostering a deeper exploration of the course's impact within the specific region and across the different subjects taught by the teachers.

To further ensure the validity of our data, we involved other researchers - who are not authors of this study - in the data analysis process to mitigate confirmation bias. These additional researchers independently reviewed and analyzed the data, providing alternative perspectives and interpretations, mitigating the risk of our biases due to the participatory approach we employed.

During the implementation and evaluation phases, we primarily conducted observations to carefully observe and document both the positive aspects of the implementation and any issues that emerged. These observations were an integral part of our data collection process and were closely connected to the diary we maintained. During the implementation phase, our observations involved actively monitoring and noting various aspects of the project. We observed the participants' behaviors, interactions, and engagement levels, as well as the overall progress and effectiveness of the implementation. We paid particular attention to identifying positive elements such as successful strategies, effective teaching methods, and instances of student enthusiasm or achievement. Simultaneously, we diligently documented any challenges or issues that arose during the implementation. These could include difficulties encountered by the teachers, unexpected obstacles, or areas where improvements were needed. By systematically recording both positive aspects and issues in our diary, we ensured a comprehensive and accurate account of the implementation process. The diary served as a central repository for our observations, allowing us to capture our real-time impressions and detailed descriptions. It acted as a logbook where we documented our observations, providing a chronological record of events, behaviors, and emerging patterns in terms of barriers, enablers, and outcomes. The connection between our observations and the diary was crucial in maintaining a thorough and reliable record of the implementation. By consistently noting our observations in the diary, we established a transparent and traceable link between the data collection process and our reflections on the project. This connection enabled us to refer back to specific instances, compare observations over time, and support our analysis and conclusions with concrete evidence.

At the end of the implementation, together with the teachers, we engaged in a critical reflection (both through individual and group interviews), discussing strengths, weaknesses, opportunities and threats about the entire activity. In order to thoroughly examine the barriers, enablers, and outcomes of the implemented experiential learning activities, we conducted a total of 20 individual interviews with the participating teachers

and organized two group interviews to facilitate critical reflections. These group interviews were conducted separately, with one taking place in Italy and the other in Switzerland, allowing for a cross-regional perspective on the subject matter.

The individual interviews provided us with valuable insights into the teachers' personal experiences and perspectives regarding the experiential learning activities. Additionally, the group interviews served as platforms for collective critical reflection. By bringing together teachers from the same region, we created a space for collaborative discussion and the exploration of shared experiences. The group interviews fostered a rich dialogue among participants, enabling them to critically analyze and discuss the barriers, enablers, and outcomes of the experiential learning activities. Moreover, by conducting separate group interviews in Italy and Switzerland, we sought to capture any contextual differences or regional variations that might influence the experiences and perspectives of the teachers.

To strengthen the credibility of our observations, we cross-referenced them with the insights obtained from the interviews with the teachers. By triangulating the data from multiple sources, we aimed to establish convergence and consistency in our findings, thereby enhancing the reliability of the study.

Throughout the study, our role as researchers involved facilitating the sessions and interactions with the teachers. We provided guidance, support, and expertise to ensure the smooth progress of the activities. However, we remained mindful of the potential influence of our presence and sought to minimize any impact on the participants' behaviors or responses. We strived to maintain an unbiased stance, allowing the teachers to express their thoughts and experiences freely.

The data was analyzed using thematic analysis as used in participatory action research (Kemmis and McTaggart, 2005; Reason & Bradbury, 2008; Wallerstein & Duran, 2010). In particular, after collecting the data, we reviewed and discussed the data to identify themes and patterns that emerged, together with the teachers. We used an iterative process of analysis and feedback, where you continuously refined the themes and patterns until a final set of themes emerged that accurately represented the data. Firstly, the teachers and the researchers reviewed the interviews and observation notes. We discussed any discrepancies or issues with the data and made sure that everyone agreed on the accuracy of the transcriptions. Secondly, we read through the transcriptions and our diaries and highlighted important words or phrases that stood out. We then generated a list of initial codes, based on these highlights. Thirdly, we worked together to group the codes into themes based on their similarities and differences. We discussed the themes and refined them until we had a set of overarching themes that captured the key issues that emerged from the data. This was a

particularly significant step as the different backgrounds between teachers and researchers emerged. Therefore, we refined the themes to make sure they accurately represented the data.

In the subsequent section, we highlight our findings, by describing the themes analyzed and discussing their implications for the development of teaching activities aimed at developing entrepreneurial competences.

4. Results

The present action research reveals that the approach produced some insights regarding three main themes: (1) barriers; (2) enablers; (3) outcomes.

4.1 Barriers to an open and collaborative process to co-design entrepreneurial competences developing educational activities

We identified three main barriers that hindered the co-design of the educational activities suggested by the teachers. The first insight of our study reveals the lack of an institutional strategy regarding how to include entrepreneurship education in secondary schools as a key barrier. During the planning phase, researchers and teachers worked together. However, during the implementation, the lack of support, commitment and clear strategy from the education institutes sometimes hindered the full implementation of the activity designed. This emerging theme was consistently identified through both individual and group interviews, highlighting its significance in shaping the outcomes of the study. During the individual interviews, participants expressed their concerns and frustrations regarding the absence of a clear institutional strategy to support and guide the implementation of experiential learning activities. They highlighted the lack of overarching goals, guidelines, and resources dedicated to integrating such practices into the curriculum. Teachers emphasized that without a well-defined strategy, they faced difficulties in effectively implementing experiential learning and realizing its full potential. Furthermore, there were instances where the activities proposed by the teachers were found to be in direct conflict with the school program and its established goals.

“When the subject expert has been informed of our activity, s/he said that it was difficult to find connections with the school program and goals.

I needed to quit the activity”

(Teacher, Switzerland).

The group interviews further substantiated this finding as participants engaged in collective critical reflections. Teachers from different regions, representing diverse perspectives, echoed similar sentiments regarding the absence of institutional strategies. They emphasized the need for comprehensive institutional support, including policy frameworks, professional development opportunities, and collaborative networks, to address the barriers and maximize the benefits of experiential learning activities. These findings shed light on the crucial role that institutional strategy plays in shaping the success of experiential learning initiatives. The lack thereof poses significant challenges for teachers and limits the potential impact of these activities on student learning outcomes. Based on the collective insights gathered from both individual and group interviews, it is evident that establishing a robust institutional strategy is essential to overcome barriers and effectively harness the benefits of experiential learning. These results underscore the importance of advocating for the development and implementation of institutional strategies that provide clear guidance, support, and resources to educators. By addressing this critical gap, educational institutions can create an enabling environment that promotes the successful integration of experiential learning approaches, ultimately enhancing teaching practices and fostering meaningful learning experiences for students.

A second significant barrier identified in our study was the lack of a collaborative ecosystem involving the university, teachers, their institute, and other institutional actors, such as the Ministry of Education. Throughout our research, we primarily engaged with highly self-motivated teachers. However, to ensure a successful implementation of the approach, it is crucial to involve teachers who may initially perceive entrepreneurship education as irrelevant. The co-design stage plays a pivotal role in addressing fears and prejudices, enabling a more inclusive and effective implementation.

These findings emerged not only from our direct observations but were also substantiated by individual interviews conducted during the critical reflection phase. By combining these two data sources, we obtained a comprehensive understanding of the barrier and its impact on the implementation process.

*“During the implementation, I missed the support of my other colleagues that did not trust in these kinds of activities”
(Teacher, Italy).*

It is worth noting that the absence of a collaborative ecosystem hindered the full potential of the approach. The absence of active involvement from key stakeholders limited the support, resources, and guidance available to teachers. This, in turn, impeded the holistic integration of entrepreneurship education into the curriculum and prevented the realization of its intended

benefits. Therefore, our study underscores the significance of fostering a collaborative environment that encourages the active participation of all relevant institutional actors.

A third significant aspect that emerged from our study was the need for monitoring pupils' and teachers' entrepreneurial competences. Throughout our research, we did not conduct a survey or utilize other detection methods to assess the pre-existing and post-treatment levels of entrepreneurship competences. However, we recognize the importance of such monitoring in evaluating the effectiveness of the approach and identifying areas that require further improvement. By actively monitoring the entrepreneurial competences of both pupils and teachers, we would have gained valuable insights into the impact of the approach used. This type of monitoring enables a comprehensive assessment of the effectiveness of the implemented activities and helps identify any challenges or areas in need of refinement. Incorporating the expertise of professionals in the measurement of entrepreneurial competences would provide further support in this monitoring process. These findings were derived from the combination of individual and group interviews conducted throughout the study. Participants emphasized the significance of pre- and post-treatment monitoring as a means to enhance the implementation stage of such projects. By monitoring the growth and development of entrepreneurial competences, educators can gain a clearer understanding of the progress made by both pupils and teachers, enabling targeted interventions and continuous improvement.

“I am currently uncertain about the development of my pupils' competences and the extent to which they have progressed. While we typically conduct initial assessments to measure pre-existing knowledge in new subjects, assessing entrepreneurial competences presents a unique challenge, and I lack the necessary resources to accurately evaluate these skills”
(Teacher, Switzerland).

4.2 Enablers of a better open and collaborative process to co-design entrepreneurial competences developing educational activities

We identified three particular enablers that (may) make the entire co-design process stronger. The first enabler we identified was active tutoring following the course, aimed at facilitating the successful implementation of co-designed teaching activities. We observed that in cases where we only

offered technical support without ongoing guidance, teachers faced greater challenges in sustaining the activities. It became evident that our role should resemble that of mentors, similar to coaches for entrepreneurs in startup acceleration programs. By providing encouragement and assistance during difficult situations, we discovered that maintaining high motivation among teachers was essential. This insight emerged from both individual and group interviews, as it became apparent that many teachers still harbored insecurities about the technical aspects of entrepreneurship. Recognizing their concerns, we realized the importance of offering ongoing support and guidance throughout the implementation process. By adopting a mentorship approach, we aimed to instill confidence, provide guidance, and help teachers navigate obstacles they encountered while fostering a positive and motivating environment. The mentorship role we embraced, inspired by entrepreneurial coaching practices, proved beneficial in addressing teachers' insecurities and keeping their motivation high. The insights gained from individual and group interviews underscored the need for ongoing support, ultimately contributing to the successful implementation of entrepreneurial competences developing educational activities.

*“The key to the successful implementation of the activity was that researchers were also present during the implementation in class, mainly to support me emotionally”
(Teacher, Italy).*

The second key enabler pertains to the teachers' realization that they do not need to acquire an entirely new set of skills. Through the utilization of backward design as a common language with the teachers, we successfully fostered an awareness of the importance of developing entrepreneurship competence. Teachers came to understand that they had already been implementing various activities that aligned with entrepreneurship competences, albeit in a fragmented manner. Our approach enabled them to systematize these activities, creating a more cohesive framework. Furthermore, the individual interviews conducted during the design phase shed light on how the activities closely resembled initiatives that the teachers had previously implemented, even though they had not explicitly identified them as entrepreneurship-related. This discovery served to validate their existing efforts and further contributed to their understanding and acceptance of entrepreneurship education. Remarkably, our approach not only enabled teachers to develop systematized activities but also facilitated the improvement of their entrepreneurial mindset. As a result, they emerged as enthusiastic ambassadors of entrepreneurship education within their schools, despite facing criticism from some of their colleagues. This valuable insight emerged from the individual interviews, which highlighted the

teachers' recognition of the parallels between the activities designed and the initiatives they had previously undertaken. This realization fostered a sense of confidence and ownership among the teachers, empowering them to embrace entrepreneurship education and advocate for its value within their educational settings.

"You are an expert in entrepreneurship and you call these skills entrepreneurial competences.

I call them soft skills, and I have learnt some new vocabulary for my profession"
(Teacher, Switzerland).

The third enabler that emerged from our study revolved around leveraging digital technologies for educational purposes as a means to foster entrepreneurial competences. Numerous activities were implemented during the COVID-19 pandemic, and surprisingly, the use of digital tools proved to be an invaluable asset in nurturing skills associated with entrepreneurship, such as flexibility, adaptability to change, and resilience in the face of uncertainty. Interestingly, the adoption of digital tools was not perceived as a barrier; rather, it served as a powerful support system in enabling the development of entrepreneurial competences. This insight emerged from our observations, which were recorded in our diaries, and further reinforced through in-depth discussions during the group interviews conducted after the implementation phase. In particular, various digital tools, such as *miro*, shared documents, mind maps, and others, played a pivotal role in cultivating entrepreneurial competences. In fact, these tools offered collaborative spaces, enhanced communication and information sharing, facilitated creativity and problem-solving, and provided opportunities for real-time feedback and reflection. The seamless integration of these digital resources into the educational process contributed to the development of entrepreneurial skills among both teachers and students. It is noteworthy to mention that our study did not observe any hindrance in the development of entrepreneurial skills caused by the use of digital tools. On the contrary, these tools served as catalysts for fostering entrepreneurial competences, empowering individuals to adapt to changing circumstances, think innovatively, and navigate uncertainties effectively.

"Both teachers and pupils were in difficulty because of the COVID-19 situation that obliged us to teach remotely. However, I realize that my pupils and I improved a lot in dealing with uncertainty and seeing the unknown positively rather than with fear"
(Teacher, Italy).

Outcomes of an open and collaborative process to co-design entrepreneurial competences developing educational activities

We also assessed some impact and outcomes at three levels: the lecturers and their pedagogy, the learners, and professional associations around the schools.

Our study unveiled a profound impact on the pedagogical practices of teachers, highlighting a notable shift in their approach to planning and conceptualizing the subjects they teach. Integrating experiential learning activities aimed at fostering entrepreneurial competences triggered a transformative evolution in their pedagogical strategies. This shift was evident across multiple stages, including planning, implementation, and subsequent discussions regarding the future trajectory of the activities. During the planning phase, teachers actively engaged in co-designing the activities, drawing upon their expertise and creativity to craft meaningful learning experiences. They became more intentional in aligning the activities with the development of entrepreneurial competences, ensuring a comprehensive and immersive educational journey for their students. This shift in planning involved considering real-world scenarios, problem-solving tasks, and opportunities for critical thinking and decision-making, all aimed at nurturing entrepreneurial mindsets. In the implementation stage, teachers embraced a more facilitative role, creating an environment conducive to experiential learning. They fostered collaboration, encouraged students to take ownership of their learning, and provided guidance when needed. The incorporation of entrepreneurial competences into the curriculum led to dynamic classroom interactions, where students actively explored and applied their knowledge in practical contexts. Teachers observed how this shift empowered students, cultivating their confidence, resilience, and adaptability. Subsequent discussions about the future of the activities further solidified the impact on pedagogy. Teachers engaged in reflective dialogue, exchanging insights, and sharing best practices. They recognized the value of integrating experiential learning and entrepreneurial competences into their teaching repertoire. This realization prompted them to explore new instructional methodologies, seek professional development opportunities, and collaborate with colleagues to continually refine their pedagogical approaches.

*“Integrating experiential learning activities for entrepreneurial competences has completely reshaped how I approach my teaching. I now view my role as a facilitator, guiding students on their journey of discovery of the subject, while empowering them to apply their learning in meaningful ways”
(Teacher, Switzerland).*

While our study did not involve a formal measurement of the level of competences attained, our comprehensive observations and insights gleaned from individual and group interviews provided compelling evidence of a significant impact on the learners. The carefully designed activities aimed at fostering entrepreneurial competences effectively ignited a heightened level of engagement among the pupils, resulting in a transformative learning experience. Moreover, the positive impressions expressed by parents further reinforced the effectiveness of these activities in promoting their pupils' development. Throughout the implementation of the activities, we observed an evident increase in pupils' motivation and enthusiasm. They actively embraced the challenges presented by the experiential learning tasks, displaying a remarkable level of involvement and commitment. The activities created a dynamic learning environment that stimulated students' curiosity, encouraged their exploration of entrepreneurial concepts, and nurtured their critical thinking and problem-solving abilities. Pupils were observed engaging in collaborative discussions, displaying creativity in generating innovative ideas, and demonstrating less fear of failure. Moreover, the feedback received from parents during the meeting the teachers had with them underscored the positive impact of the activities. Parents expressed satisfaction with their children's increased engagement and enthusiasm towards learning. They recognized the value of the experiential approach in fostering a broader set of skills beyond disciplinary knowledge, equipping their children with essential competences for future success. Parents also highlighted the improved confidence and self-belief exhibited by their children, which extended beyond the classroom into various aspects of their lives.

“Contrary to my initial concerns, it became evident that parents not only embraced the program but also expressed deep appreciation for the valuable skills their children were equipped with, essential for their future in the ever-evolving world of work”
(Teacher, Italy).

The impact of the project extended beyond the school walls and resonated within the professional associations surrounding the educational community. The integration of entrepreneurship education sparked considerable interest among entrepreneurs and business owners, eliciting a wave of curiosity that led them to visit the classroom and observe the innovative approach and activities firsthand. This heightened attention from professionals in diverse industries signifies a transformative shift in bridging the longstanding gap between educational institutions and the dynamic world of work. Entrepreneurs and business owners recognized the value and

relevance of equipping students with entrepreneurial competences from an early age. They saw the potential of nurturing these skills as a means to foster innovation, adaptability, and an entrepreneurial mindset among the future workforce. The enthusiastic response from professionals further validated the importance of integrating entrepreneurship education within the school curriculum.

“Witnessing the integration of entrepreneurship education in the classroom has been truly inspiring. I believe this initiative will play a significant role in bridging the gap between schools and the job market”
(Entrepreneur, Italy).

The growing interest and support from professional associations underscore the potential long-term impact of the project. By forging meaningful connections between the school and the broader community, the project not only enriched the educational experience but also opened doors to future collaborations, mentorship opportunities, and internships for students. This symbiotic relationship between the school realm and the professional world has the potential to create a more seamless transition for students as they embark on their career paths.

5. Discussion

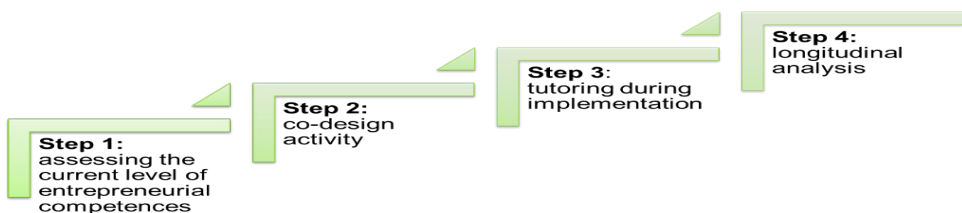
The barriers, enablers, and outcomes identified in our study have important theoretical implications for the field of entrepreneurship education and the open and collaborative innovation processes. These findings contribute to the existing literature by shedding light on key factors that influence the successful implementation of educational activities aimed at fostering entrepreneurial competences. First, we highlighted the role of an institutional strategy and the need to collaborate with the school ecosystem. The lack of an institutional strategy regarding the inclusion of entrepreneurship education in secondary schools and the absence of a collaborative ecosystem involving multiple stakeholders, such as the university, teachers, their institute, and the Ministry of Education, are significant barriers identified in our study. These findings align with the work of Brüne and Lutz (2020) and Jardim et al. (2021), who also emphasize the importance of institutional support and collaboration between different actors in entrepreneurship education. The theoretical implication is that a cohesive and well-defined institutional strategy, along with a collaborative ecosystem, is crucial for creating an enabling environment that supports the co-design process. Second, our study highlights the lack of monitoring of pupils' and

teachers' entrepreneurial competences as a barrier to the co-design process. This finding underscores the need for ongoing assessment and evaluation of competences to track progress and identify areas for improvement. The work of Nabi et al. (2017) is relevant here, as they emphasize the importance of longitudinal analysis in entrepreneurship education. Our study underscores the recognition that continuous monitoring and assessment are essential for understanding the effectiveness of educational activities and facilitating competence development. Third, the identification of active tutoring following the course as an enabler in the co-design process aligns with previous research. Perry et al. (1998) highlight the effectiveness of providing opportunities for teachers to engage in professional development and serve as visiting lecturers at universities. The present study goes beyond that and implies that active tutoring and ongoing support contribute to the successful implementation of co-designed teaching activities between university scholars and secondary schools' teachers. Additionally, the utilization of backward design as a common language with teachers is an enabler that fosters an awareness of the importance of developing entrepreneurship competence. This finding resonates with the instructional design literature, particularly the work of Wiggins and McTighe (1998), emphasizing the significance of backward design in curriculum development. Fourth, the observed shift in teachers' pedagogical practices, reflecting a change in their approach to planning and conceptualizing subjects, has theoretical implications for the field of entrepreneurship education. This finding aligns with Bacigalupo et al. (2016), who emphasize the transformative impact of entrepreneurship education on teachers' practices. The theoretical implication is that co-design activities can influence teachers' pedagogical approaches, promoting more student-centered and experiential learning methods (Cerquetti et al., 2021; Hahn et al., 2021), also enhanced by digital technologies implemented during the Covid-19 pandemics (Liguori and Winkler, 2020). Furthermore, the significant impact on learners and professionals in diverse industries signifies a transformative shift in bridging the gap between educational institutions and the dynamic world of work. This finding resonates with the literature on entrepreneurship education's broader societal impact and the need for educational programs to prepare students for real-world challenges (Morris et al., 2013).

By discussing our main insights, we have determined that in order to collaboratively design educational activities aimed at cultivating entrepreneurship competences among secondary school pupils, a systemic framework can be suggested. This framework encompasses the following steps. Firstly, it is essential for entrepreneurship scholars to assess the existing level of entrepreneurship competences among both teachers and students. To effectively evaluate these competences, the entrepreneurial aptitude test (TAI) (Cubico et al., 2010) could be employed as a potential tool, as it offers

the advantage of employing quantitative methods for inference-making. Additionally, assessing competences requires the utilization of qualitative methodologies. In fact, evaluating participants' performance in realistic tasks provides an ideal context for assessing competence development (Tardif, 2006). Secondly, teachers and entrepreneurship scholars need to engage in co-design activities. By employing the EntreComp Framework as the conceptual foundation and utilizing the instructional design method of backward design (Wiggins and McTighe, 1998), interesting experiential learning activities can be developed, as outlined in the methodology section. However, in line with Ganesini et al.'s (2018) analysis, it is advisable to adopt a comprehensive perspective that encompasses not only skills and knowledge but also personality traits when considering the components of entrepreneurial competences. Thirdly, teachers should implement these activities with the guidance and support of entrepreneurship scholars. Throughout the implementation process, researchers can provide a suitable framework for conducting the activities, ensuring that the goal of developing the selected entrepreneurial competences remains a priority. This approach expands the co-design process into an open and collaborative innovation landscape, which is also present during the implementation phase in the classroom. Fourthly, university researchers, secondary school teachers and directors, as well as institutional actors like the Ministry of Education, should collaborate to establish an observatory to validate the outcomes of the various activities. Longitudinal analysis can be conducted and supplemented with new data and experiences to validate the most effective activities. This addresses the significant concern raised by Nabi et al. (2017) regarding the lack of longitudinal analysis in entrepreneurship education. As a summary, Figure 2 represents our framework.

Fig. 2. Entrepreneurial Competences Development Co-Creation Framework



Source: Developed by authors

6. Conclusion

Entrepreneurial competences are at the core of entrepreneurship education (Cubico and Favretto, 2018; Edwards-Schachter *et al.*, 2015). In particular, these competences are embedded in experiential entrepreneurship education that aims at developing the competences to think and act as an entrepreneur, beyond the competences required to found a company (Fayolle *et al.*, 2006; Kuratko and Morris, 2019; Morris *et al.*, 2013). However, despite entrepreneurship education being an increasingly relevant topic among entrepreneurship scholars, scant attention has been paid to the role of universities and secondary schools in developing entrepreneurial competences (Aparicio *et al.*, 2019; Jones and Underwood, 2017). Moreover, no prior studies examine the opportunities for collaboration between universities (i.e., entrepreneurship scholars) and secondary school teachers in the co-design of educational activities that foster pupils' entrepreneurial competences. In response to the research questions "How do entrepreneurship scholars and secondary school teachers co-design educational activities that foster pupils' entrepreneurship competences?" and "How do barriers, enablers, and impact/outcomes influence this co-design process?", our study provides explicit answers. By contributing to the existing literature on entrepreneurship education, we assert that experiential learning in entrepreneurship education proves to be a powerful tool for designing effective entrepreneurship education programs (Cerquetti *et al.*, 2021; Hahn *et al.*, 2021). Moreover, we extend our knowledge about this field by incorporating the EntreComp Framework (European Commission, 2016). Moreover, we tested the application of the backward design (Wiggins and McTighe, 1998) as an approach to design educational activities that actually foster desired entrepreneurial competences in all kinds of subjects in secondary schools. In other words, our approach contributes to the literature on entrepreneurial competences and entrepreneurship education by providing a practical tool to secondary school teachers - highlighting the need for doing things differently and not re-inventing the wheel.

Furthermore, our study contributes to the existing literature on open and collaborative innovation in school contexts, particularly co-creation and co-design approaches. We developed a co-design process framework, by understanding its barriers, its enablers, and its outcomes within an open and collaborative innovation approach. Hence, we contribute by suggesting a process of reconsidering the collaborative, rather than complementary, role of universities and secondary schools in the development of entrepreneurial competences (Perry *et al.*, 1998). We applied an open and collaborative innovation framework, specifically in relation to the ecosystem of entrepreneurship education, to facilitate the co-design process (Brüne and Lutz, 2020; Jardim *et al.*, 2021). This framework drew upon the

principles of open innovation, which emphasizes the importance of external collaboration and the integration of diverse perspectives and expertise (Chesbrough, 2003). In the context of entrepreneurship education, the application of this framework fostered a dynamic and inclusive approach by involving multiple stakeholders, including entrepreneurship scholars, secondary school teachers, university researchers, and institutional actors such as the Ministry of Education. By embracing the principles of open and collaborative innovation, we created a conducive environment for knowledge sharing, idea generation, and co-creation that sheds new light on the substantial impact of university faculty on educational reforms in secondary schools (Kersh and Masztal, 1998). This approach recognized that the process of designing educational activities to foster entrepreneurship competences requires the collective effort and expertise of various actors within the entrepreneurship education ecosystem.

The present study also has practical implications. Firstly, as universities are increasingly called for their “third mission” about contributing to the socio-economic development of the territory (Colasanti *et al.*, 2017), we see opportunities for the implementation of an open innovation ecosystem, involving universities, teachers, schools, and institutional actors, with the aim of improving the (entrepreneurship) education of tomorrow. Secondly, in the long run, we could also suggest that entrepreneurship could be part of the curriculum of aspiring secondary school teachers during their training, by adding a phase 0 to our framework. Thirdly, one of the main added values of our approach lies in the consistency of the teaching activities developed, keeping in mind the pedagogical goals of every subject. In fact, we do not substitute the teachers while implementing the activities. Rather, we facilitate a revision of their current educational practice and make them responsible for the development of entrepreneurship competences. In this way, pupils do not see the activity as a stand-alone moment. Pupils will develop subject-related competences while simultaneously developing entrepreneurial competences with the very same teacher they are used to. Lastly, our study has implications for designing and implementing effective project policies that involve secondary schools and universities are significant. Based on our findings, we can offer several suggestions to enhance the collaboration between these two entities and promote the development of entrepreneurship competences among students. It is crucial to establish a clear institutional strategy that outlines how entrepreneurship education will be integrated into secondary schools. This strategy should emphasize the importance of collaboration between universities and schools, providing a framework for joint initiatives and shared goals. Then, building a collaborative ecosystem involving secondary schools, universities, teachers, and other institutional actors, such as the Ministry of Education, is essential. This ecosystem should facilitate regular communication, knowl-

edge sharing, and collaborative efforts to co-design educational activities. Additionally, it is crucial to emphasize teacher professional development. Teachers should be made aware that they do not need to acquire an entirely new set of skills to incorporate entrepreneurship education into their teaching practices. By using backward design as a common language and providing training opportunities, teachers can develop the confidence and competence needed to effectively deliver entrepreneurship education. Moreover, digital technologies can play a pivotal role in fostering entrepreneurial competences. Integrating digital tools and platforms into educational activities can enhance engagement, collaboration, and creativity among students. Therefore, it is important to leverage digital technologies for educational purposes, creating a digital learning environment that supports the development of entrepreneurship competences.

Our study also has several limitations that could serve as focus areas for future research. We did not entirely solve the question of how to measure the development of entrepreneurial competences. Given the already existence of quantitative tools such as surveys (Cubico *et al.*, 2010), we suggest that scholars engage in the development of qualitative evaluations of entrepreneurial competences. Interdisciplinary work with pedagogy experts may help develop innovative evaluation tools. Moreover, we only engaged with very motivated teachers. Results may have been different by engaging in a co-design process with reluctant teachers and may require a revision of the process, by adding some sense-making activity to establish a stronger connection with teachers.

References

- Aparicio, G., Iturralde, T., & Maseda, A. (2019). Conceptual structure and perspectives on Entrepreneurship education research: A bibliometric review. *European Research on Management and Business Economics*, 25(3), 105-113. <https://doi.org/10.1016/j.iedeen.2019.04.003>
- Audretsch, D. B. (2009). Emergence of the entrepreneurial society. *Business Horizons*, 52(5), 505-511. <https://doi.org/10.1016/j.bushor.2009.06.002>
- Bacigalupo, M., Kampylis, P., Punie, Y. & Van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*. European Commission, Brussels. <https://doi.org/10.21125/iceri.2016.1150>
- European Commission. (2020). Joint Research Centre. Bacigalupo, M., Weikert García, L., Mansoori, Y. et al., *EntreComp Playbook – Entrepreneurial learning beyond the classroom*, Publications Office, 2020. <https://data.europa.eu/doi/10.2760/77835>
- Bissola, R., Imperatori, B., & Biffi, A. (2017). A rhizomatic learning process to create collective knowledge in entrepreneurship education: Open innovation and collaboration beyond boundaries. *Management Learning*, 48(2), 206-226. <https://doi.org/10.1177/1350507616672735>
- Bitetti, L. (2022). A Process-Based Framework around “Lighthouse Projects” for Business Model Innovation. *International Journal of Innovation Management*, 26(09), 2240022. <https://doi.org/10.1142/S1363919622400229>
- Bitetti, L. (2019). Activate business model learning through flipped classroom and backward design. *Journal of Business Models*, 7(3), 100-110. <https://doi.org/10.5278/ojs.jbm.v7i3.3137>
- Bitetti, L., & Gibbert, M. (2022). The ROAD to continuous business model innovation: A longitudinal study unveiling patterns of cognitive sensing dynamic capabilities. *Creativity and Innovation Management*, 31(1), 123-140. <https://doi.org/10.1111/caim.12477>
- Bressoux, P., & Bianco, M. (2004). Long-term teacher effects on pupils’ learning gains. *Oxford review of education*, 30(3), 327-345. <https://doi.org/10.1080/0305498042000260476>
- Brüne, N., & Lutz, E. (2020). The effect of entrepreneurship education in schools on entrepreneurial outcomes: a systematic review. *Management Review Quarterly*, 70(2), 275-305. <https://doi.org/10.1007/s11301-019-00168-3>
- Caputo, A., & Pellegrini, M. M. (2020). Introduction to “The Entrepreneurial Behaviour: Unveiling the Cognitive and Emotional Aspect of Entrepreneurship”. In *The Entrepreneurial Behaviour: Unveiling the cognitive and emotional aspect of entrepreneurship*. Emerald Publishing Limited. <https://doi.org/10.1108/978-1-78973-507-920201003>
- Carayannis, E. G., & Campbell, D. J. (2009). “Mode 3” and “Quadruple Helix”: Toward a 21st-century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3-4), 201-234. <https://doi.org/10.1504/ijtm.2009.023374>
- Carr, W., & Kemmis, S. (2009). Educational action research: A critical approach. In *Sage handbook of educational action research* (pp. 74-84). SAGE Publications Ltd. <https://doi.org/10.4135/9780857021021.n8>
- Casey, A. (2013). ‘Seeing the trees not just the wood’: steps and not just journeys in teacher action research. *Educational Action Research*, 21(2), 147-163. <https://doi.org/10.1080/09650792.2013.789704>
- Cerquetti, M., Compagnucci, L., Cossiri, A., Gistri, G., & Spigarelli, F. (2021). Fostering student entrepreneurial skills in sshs. The case of “impresa in aula”. *Piccola Impresa/Small Business*, 1, 119-139. <https://doi.org/10.14596/pisb.2825>
- Cesaroni, F. M., & Sentuti, A. (2014). How to prepare younger generations in family firms? A didactic laboratory on generational transfer. *Quality in Higher Education*, 1(1), 57-68.
- Chesbrough, H. (2004). Managing open innovation. *Research-technologymanagement*, 47(1),

23-26. <https://doi.org/10.1080/08956308.2004.11671604>

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.

Christensen, C. M., Dillon, K., Hall, T., & Duncan, D. S. (2016). *Competing against luck: The story of innovation and customer choice*. New York, NY: HarperBusiness an imprint of HarperCollins Publishers.

Colasanti, N., Frondizzi, R., Huber, A., & Bitetti, L. (2017). Le università diventano incubatori. Tre casi di innovazione sociale. *Sviluppo e Organizzazione*.

Cope, J. (2005). Toward a dynamic learning perspective of entrepreneurship. *Entrepreneurship theory and practice*, 29(4), 373-397. <https://doi.org/10.1111/j.1540-6520.2005.00090.x>

Corbett, A. C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, 22(1), 97-118. <https://doi.org/10.1016/j.jbusvent.2005.10.001>

Cova, B., Dalli, D., & Zwick, D. (2011). Critical perspectives on consumers' role as 'producers': Broadening the debate on value co-creation in marketing processes. *Marketing Theory*, 11(3), 231-241.

<https://doi.org/10.1177/1470593111408171>

Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. Bethesda (Maryland): National Institutes of Health, 2013, 541-545.

Cubico, S., & Favretto, G. (2018). Competenze imprenditoriali e imprenditoria giovanile: modelli, strumenti ed esperienze. *Quaderni di ricerca sull'artigianato*, 6(3), 373-394. <https://doi.org/10.12830/92049>

Cubico, S., Bortolani, E., Favretto, G., & Sartori, R. (2010). Describing the entrepreneurial profile: the entrepreneurial aptitude test (TAI). *International Journal of Entrepreneurship and Small Business*, 11(4), 424-435. <https://doi.org/10.1504/ijesb.2010.036295>

Dick, W., Carey, L., & Carey, J. O. (Eds.). (2015). *The systematic design of instruction*. Pearson.

Diegoli, R. B. & Gutierrez, H. S. M. (2018). Teachers as entrepreneurial role models the impact of a teacher's entrepreneurial experience and student learning styles in entrepreneurial intentions. *Journal of Entrepreneurship Education*, 21(1), 1-11.

Dimov, D., & Pistrui, J. (2020). Recursive and Discursive Model of and for Entrepreneurial Action. *European Management Review*, 17(1), 267-277. <https://doi.org/10.1111/emre.12360>

Dorji, T. (2021). Content Analysis of Entrepreneurship Education in Primary and Secondary School Textbooks. *Research in Educational Policy and Management*, 3(1), 42-59. <https://doi.org/10.46303/repam.2021.3>

Edwards-Schachter, M., García-Granero, A., Sánchez-Barrioluengo, M., Quesada-P. H., & Amara, N. (2015). Disentangling competences: Interrelationships on creativity, innovation and entrepreneurship. *Thinking Skills and Creativity*, 16, 27-39. <https://doi.org/10.1016/j.tsc.2014.11.006>

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations. *Research Policy*, 29(2), 109-123. [https://doi.org/10.1016/s0048-7333\(99\)00055-4](https://doi.org/10.1016/s0048-7333(99)00055-4)

Etzkowitz, H., & Leydesdorff, L. (1995). The Triple Helix-University-industry-government relations: a laboratory for knowledge based economic development. *EASST Review*, 14(1), 14-19.

European Commission. (2016). *Entrepreneurship Education at School in Europe*. Eurydice. Retrieved from: https://eacea.ec.europa.eu/national-policies/eurydice/content/entrepreneurship-education-school-europe_en

European Commission. (2018). *EntreComp into Action - Get inspired, make it happen: A user guide to the European Entrepreneurship Competence Framework*. Publications Office of the European Union.

Fayolle, A. (2013). Personal views on the future of entrepreneurship education. *Entrepreneurship & Regional Development*, 25(7/8), 692-701. <https://doi.org/10.1080/08985626.2013.821318>

Fayolle, A., Gailly, B., & Lassas-Clerc, N. (2006). Assessing the impact of entrepreneurship education programmes: A new methodology. *Journal of European Industrial Training*, 30(9), 701-720.

<https://doi.org/10.1108/03090590610715022>

Fejes, A., Nylund, M., & Wallin, J. (2019). How do teachers interpret and transform entrepreneurship education?. *Journal of Curriculum Studies*, 51(4), 554-566. <https://doi.org/10.1080/00220272.2018.1488998>

Floris, M., & Pillitu, D. (2019). Improving entrepreneurship education in primary schools: a pioneer project. *International Journal of Educational Management*, 33(6), 1148-1169. <https://doi.org/10.1108/ijem-09-2018-0283>

Gabbianelli, L., Bonfanti, A., Adai, C. R. L., & Mion, G. (2021). An overview of students' entrepreneurial intention antecedents. *Piccola Impresa/Small Business*, 1, 48-77. <https://doi.org/10.14596/pisb.2841>

García, J., Ward, A., Hernández, B., & Florez, J. (2017). Educación emprendedora: Estado del arte. *Propósitos y Representaciones*, 5(2), 410-473. <https://doi.org/10.20511/pyr2017.v5n2.190>

Gemser, G., & Perks, H. (2015). Co-creation with customers: An evolving innovation research field. *Journal of Product Innovation Management*, 32(5), 660-665. <https://doi.org/10.1111/jpim.12279>

Gianesini, G., Cubico, S., Favretto, G., & Leitão, J. (2018). Entrepreneurial competences: comparing and contrasting models and taxonomies. In *Entrepreneurship and the industry life cycle* (pp. 13-32). Springer, Cham. https://doi.org/10.1007/978-3-319-89336-5_2

Gibb, A. (2011). Concepts into practice: meeting the challenge of development of entrepreneurship educators around an innovative paradigm. The case of the International Entrepreneurship Educators' Programme (IEEP). *International Journal of Entrepreneurial Behaviour & Research*, 17(2), 146-165. <https://doi.org/10.1108/1355255111114914>

Greenwood, D. J., & Levin, M. (2006). *Introduction to action research: Social research for social change*. SAGE publications.

Grigg, R. (2020). EntreCompEdu, a professional development framework for entrepreneurial education. *Education+ Training*.

Grönroos, C. (2011). Value co-creation in service logic: A critical analysis. *Marketing theory*, 11(3), 279-301.

<https://doi.org/10.1177/1470593111408177>

Hahn, D., Minola, T., Bosio, G., & Cassia, L. (2020). The impact of entrepreneurship education on university students' entrepreneurial skills: a family embeddedness perspective. *Small Business Economics*, 55, 257-282. <https://doi.org/10.1007/s11187-019-00143-y>

Hahn, D., Minola, T., Cascavilla, I., Ivaldi, S., & Salerno, M. (2021). Towards a theory-informed practice of entrepreneurship education for university students: the case of HC.LAB. *Piccola Impresa/Small Business*, 1, 16-47. <https://doi.org/10.14596/pisb.2846>

Hameed, I., & Irfan, Z. (2019). Entrepreneurship education: a review of challenges, characteristics and opportunities. *Entrepreneurship Education*, 2, 135-148. <https://doi.org/10.1007/s41959-019-00018-z>

Henry, C., Hill, H., & Leitch, C. (2005). Entrepreneurship education and training: can entrepreneurship be taught? Part I. *Education and Training*, 47(1), 98-111. <https://doi.org/10.1108/00400910510586524>

Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-based Learning*, 1(1), 21-39. <https://doi.org/10.7771/1541-5015.1004>

Honig, B. (2001). Learning strategies and resources for entrepreneurs and intrapreneurs. *Entrepreneurship Theory and Practice*, 26(1), 21-34. <https://doi.org/10.1108/08985620110000001>

org/10.1177/104225870102600102

Hoppe, M. (2016). Policy and entrepreneurship education. *Small Business Economics*, 46(1), 13-29. <https://doi.org/10.1007/s11187-015-9676-7>

Hoppe, M., & Namdar, K. (2023). Towards Entrepreneurship for a Cause: Educating Transformative Entrepreneurial Selves for a Better World. *Entrepreneurship Education and Pedagogy*, 1-18. <https://doi.org/10.1177/25151274221148222>

Hussain, T., Channa, N. A., & Samo, A. H. (2021). Investigating the role of family, personality traits and self-efficacy in shaping students' entrepreneurial Intentions. *Piccola Impresa/Small Business*, 1, 78-97. <https://doi.org/10.14596/pisb.2847>

Iglesias-Sánchez, P. P., Jambrino-Maldonado, C., & de las Heras-Pedrosa, C. (2019). Training entrepreneurial competences with open innovation paradigm in higher education. *Sustainability*, 11(17), 4689. <https://doi.org/10.3390/su11174689>

Jardim, J., Bártolo, A., & Pinho, A. (2021). Towards a global entrepreneurial culture: A systematic review of the effectiveness of entrepreneurship education programs. *Education Sciences*, 11(8), 398.

<https://doi.org/10.3390/educsci11080398>

Jena, R. K. (2020). Measuring the impact of business management Student's attitude towards entrepreneurship education on entrepreneurial intention: A case study. *Computers in Human Behavior*, 107, 106275.

<https://doi.org/10.1016/j.chb.2020.106275>

Joensuu-Salo, S., Peltonen, K., Hämäläinen, M., Oikkonen, E., & Raappana, A. (2021). Entrepreneurial teachers do make a difference—Or do they?. *Industry and Higher Education*, 35(4), 536-546.

<https://doi.org/10.1177/0950422220983236>

Kemmis, S., & McTaggart, R. (2005). Participatory action research: Communicative action and the public sphere. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (3rd ed., pp. 559-603). Sage Publications. <https://doi.org/10.4135/9781473921290.n45>

Kemmis, S., McTaggart, R., & Nixon, R. (2013). *The action research planner: Doing critical participatory action research*. Springer Science & Business Media. <https://doi.org/10.1007/978-981-4560-67-2>

Kersh, M. E., & Masztal, N. B. (Eds.). (1998). An analysis of studies of collaboration between universities and K—12 schools. In *The Educational Forum* (62) 3, pp. 218-225. Taylor & Francis Group.

<https://doi.org/10.1080/00131729808984347>

Kilar, W., & Rachwał, T. (2019). Changes in Entrepreneurship Education in Secondary School under Curriculum Reform in Poland. *Journal of Intercultural Management*, 11(2), 73-105. <https://doi.org/10.2478/joim-2019-0010>

Kim, C., & Hannafin, M. J. (2011). Scaffolding problem solving in technology-enhanced learning environments (TELEs): Bridging research and theory with practice. *Computers & Education*, 56(2), 403-417.

<https://doi.org/10.1016/j.compedu.2010.08.024>

Kirkley, W. W. (2017). Cultivating entrepreneurial behaviour: entrepreneurship education in secondary schools. *Asia Pacific Journal of Innovation and Entrepreneurship*, 11(1), 17-37. <https://doi.org/10.1108/apjie-04-2017-018>

Krueger Jr, N. F. (2007). What lies beneath? The experiential essence of entrepreneurial thinking. *Entrepreneurship theory and practice*, 31(1), 123-138. <https://doi.org/10.1111/j.1540-6520.2007.00166.x>

Lakhani, K. R., & Von Hippel, E. (2004). How open source software works: "free" user-to-user assistance. *Produktentwicklung mit virtuellen Communities: Kundenwünsche erfahren und Innovationen realisieren* (pp. 303-339). Gabler Verlag https://doi.org/10.1007/978-3-322-84540-5_13

Leupen, S. M., Moin, L. J., Boyer, K. E., Brackney, B. E., & De Gagne, J. C. (2019).

Alignment of learning outcomes, instructional design, and assessments: Using backward design to design a new pharmacology course. *Journal of Nursing Education*, 58(2), 98-103.

Liguori, E., & Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. *Entrepreneurship Education and Pedagogy*, 3(4), 346-351. <https://doi.org/10.1177/2515127420916738>

Martiarena, A. (2013). What's so entrepreneurial about intrapreneurs?. *Small Business Economics*, 40(1), 27-39. <https://doi.org/10.1007/s11187-011-9348-1>

Martinez, M. G. (2014). Co-creation of value by open innovation: Unlocking new sources of competitive advantage. *Agribusiness*, 30(2), 132-147. <https://doi.org/10.1002/agr.21347>

Mitchell, J. R., Mitchell, R. K., & Randolph-Seng, B. (Eds.). (2014). Handbook of entrepreneurial cognition. Edward Elgar Publishing.

<https://doi.org/10.4337/9781781006597>

Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: a literature review and development agenda. *International Journal of Entrepreneurial Behavior & Research*, 16(2), 92-111.

<https://doi.org/10.1108/13552551011026995>

Morris, M. H., & Kuratko, D. F. (2019). Addressing Major Challenges Associated with Sustainable Entrepreneurship in Established Companies. *American Journal of Entrepreneurship*, 12(2), 5-34.

Morris, M. H., Kuratko, D. F., & Cornwall, J. R. (Eds.). (2013). Entrepreneurship programs and the modern university. Edward Elgar Publishing. <https://doi.org/10.4337/9781782544630>

Morrison, G. R., Ross, S. M., & Kemp, J. E. (2004). Designing effective instruction. John Wiley & Sons.

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: a systematic review and research agenda. *Academy Management Learning & Education*, 16(2), 277-299. <https://doi.org/10.5465/amle.2015.0026>

Neck, H. M., Greene, P. G., & Brush, C. G. (2014). Practice-based entrepreneurship education using actionable theory. In *Annals of Entrepreneurship Education and Pedagogy—2014*. Edward Elgar Publishing. <https://doi.org/10.4337/9781783471454.00008>

Peltonen, K. (2015). How can teachers' entrepreneurial competences be developed? A collaborative learning perspective. *Education + Training*, 57(5), 492-511. <https://doi.org/10.1108/et-03-2014-0033>

Peltonen, K. (2008). Can learning in teams help teachers to become more entrepreneurial? The interplay between efficacy perceptions and team support. *The Finnish Journal of Business Economics*, 3, 297-324.

Peris-Ortiz, M., Fuster-Estruch, V., & Devece-Carañana, C. (2014). Entrepreneurship and innovation in a context of crisis. In *Entrepreneurship, innovation and economic crisis* (pp. 1-10). Springer, Cham. https://doi.org/10.1007/978-3-319-02384-7_1

Perry, B., Walton, G., & Conroy, J. (1998). Visiting teaching lecturers—an experiment in collaboration between university and schools. *Asia-Pacific Journal of Teacher Education*, 26(2), 151-160.

<https://doi.org/10.1080/1359866980260206>

Politis, D. (2005). The process of entrepreneurial learning: A conceptual framework. *Entrepreneurship theory and practice*, 29(4), 399-424. <https://doi.org/10.1111/j.1540-6520.2005.00091.x>

Rasmussen, E. A., & Sørheim, R. (2006). Action-based entrepreneurship education. *Technovation*, 26(2), 185-194.

<https://doi.org/10.1016/j.technovation.2005.06.012>

Reason, P., & Bradbury, H. (Eds.). (2008). *The Sage Handbook of Action Research: Participative Inquiry and Practice*. Sage Publications.

- Romero, D., & Molina, A. (2011). Collaborative Networked Organisations and Customer Communities: Value Co-Creation and Co-Innovation in the Networking Era. *Journal of Product Planning and Control*, 22(4): 447–472. <https://doi.org/10.1080/09537287.2010.536619>
- Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *Co-design*, 4(1), 5-18. <https://doi.org/10.1080/15710880701875068>
- Sedita, S. R., & Blasi, S. (2021). Determinants and success factors of student entrepreneurship: evidence from the University of Padova. *Piccola Impresa/Small Business*, 1, 98-118. <https://doi.org/10.14596/pisb.2824>
- Tardif, J. (Eds.). (2006). *L'évaluation des compétences*. La Chenelière. Montréal.
- Teerijoki, H. & Murdock, K. A. (2014). Assessing the role of the teacher in introducing entrepreneurial education in engineering and science courses. *The International Journal of Management Education*, 12(3), 479-489. <https://doi.org/10.1016/j.ijme.2014.05.005>
- Toutain, O., Mueller, S., & Bornard, F. (2019). Decoding entrepreneurship education ecosystems (EEE): A cross-European study in primary, secondary schools and vocational training. *Management international*, 23(5), 47-65. <https://doi.org/10.7202/1066711ar>
- Van der Meer, H. (2007). Open innovation—the Dutch treat: challenges in thinking in business models. *Creativity and innovation management*, 16(2), 192-202. <https://doi.org/10.1111/j.1467-8691.2007.00433.x>
- Venkataraman S. (1997). The distinctive domain of entrepreneurship research: an editor's perspective. In *Advances in Entrepreneurship, Firm Emergence, and Growth*, Katz J, Brockhaus J (eds) (pp. 119–138). JAI Press: Greenwich, CT.
- Von Hippel, E. (2005). Democratizing innovation: The evolving phenomenon of user innovation. *Journal für Betriebswirtschaft*, 55, 63-78. <https://doi.org/10.1007/s11301-004-0002-8>
- Wallerstein, N., & Duran, B. (2010). Community-based participatory research contributions to intervention research: The intersection of science and practice to improve health equity. *American Journal of Public Health*, 100(S 1), S40-S46. <https://doi.org/10.2105/ajph.2009.184036>
- West, J., & Bogers, M. (2014). Leveraging external sources of innovation: a review of research on open innovation. *Journal of product innovation management*, 31(4), 814-831. <https://doi.org/10.1111/jpim.12125>
- Wibowo, A., & Saptono, A. (2018). Does teachers' creativity impact on vocational students' entrepreneurial intention?. *Journal of Entrepreneurship Education*, 21(3), 1-12.
- Wiggins, G., & McTighe, J. (2005). *Understanding by design*. Association for Supervision and Curriculum Development, Ascd.
- Wiggins, G., & McTighe, J. (1998). What is backward design? In *Understanding by Design*, Merrill Prentice Hall. Upper Saddle River, NJ, pp. 7–19.
- Wynarczyk, P., Piperopoulos, P., & McAdam, M. (2013). Open innovation in small and medium-sized enterprises: An overview. *International small business journal*, 31(3), 240-255. <https://doi.org/10.1177/0266242612472214>