# DESIGNING ENTREPRENEURS: STRUCTURING AN EDUCATIONAL FRAMEWORK FOR DESIGN-DRIVEN ENTREPRENEURSHIP

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## Abstract

The evolving global economy and an ever-increasing crisis, requires new sources of innovation to respond effectively to the problem. In this panorama, entrepreneurship has a central role: Startups are crucial in fostering innovation, creating jobs, and driving socio-economic growth. Startups, as a key entrepreneurial phenomenon, contribute to the development and dissemination of new solutions but face significant challenges, including market uncertainty and high failure rates mainly due to a lack of needs on the market. Design (Thinking), with its user-centred and iterative approaches, offers unique tools to address these issues, making a compelling case for integrating design-driven methodologies into entrepreneurship education. However, educational pathways concerning entrepreneurship that integrate design principles within their programs remain extremely rare, underscoring the necessity to (re)design curricula that incorporate this approach towards entrepreneurship. This paper explores how design integration can enhance entrepreneurship training in higher education, using the "Design Startup" course developed at the Design School of Politecnico di Milano as a case study – which embed a mix of Design and Management contents. Results indicate that this approach effectively equips aspiring entrepreneurs to address common startup challenges, such as misaligned products and inefficient resource use, by focusing on real user needs and iterative solution testing. The study concludes that embedding design methodologies into entrepreneurship education bridges the gap between creative problem-solving and business strategy, offering a replicable model for teaching entrepreneurial resilience and innovation, preparing new entrepreneurs to contribute in societal economy.

***Keywords:*** *Entrepreneurial education, design education, design-driven methodologies, higher education, design-driven innovation.*

## 1. Introduction and theoretical background

The implication of the global economic crisis, as escalated by the accelerated development ushered in by the Fourth Industrial Revolution, has made innovation a key instrument for elevating economic competitiveness among both developed and emerging economies (Baumol, 2002). Innovation is becoming more important for its multifaceted socio-economic effects encompassing the rise in living standards, the development of innovative products, and the increase in job opportunities.

Within this innovation paradigm, entrepreneurship, particularly entrepreneurship in the startup context, has emerged as a key driver of technological innovation and economic dynamism (Luger & Koo, 2005). Startups fulfill the role of igniting flexible, experiment-based innovation regimes that differ from the inertias of incumbent firms (Freeman & Engel, 2007). Startups also act as drivers of regional economic development as vectors of job creation, knowledge spillovers, and entrepreneurial ferment. However, for all their potential, the startup journey is fraught with risk; startup failure rates remain high. As Eisenmann (2021) discusses in Why Startups Fail, among the prime culprits is the occurrence of "false starts"–a failure to validate customer needs before launching a solution, resulting in products that ultimately have no market fit.

Of the many innovation models adopted to overcome these challenges, Design Thinking (DT) has attracted a lot of attention owing to its success in managing the uncertainty and complexity associated with entrepreneurship. Its emphasis on empathy, experimentation, and iterative development makes it a suitable complement to entrepreneurial practice. As Barringer and Gresock (2008) point out, entrepreneurship is an integrative process encompassing opportunity identification, idea generation, feasibility analysis, and implementation—each of which is supported by the flexibility and creativity that DT fosters.

This convergence of entrepreneurship and design thinking (DT) has attracted more scholarly and institutional attention in merging design methodologies with business curricula (Garbuio et al., 2018; Glen, Suciu, & Baughn, 2014; Sarooghi et al., 2019). The two fields are aligned in their dedication to opportunity development, specifically by reframing products, services, systems, and business models. This common ground fosters a future-oriented mindset that welcomes uncertainty and iterative learning—a competency essential to dealing with the turbulent dynamics of contemporary business contexts (Garbuio, 2018). In addition, design thinking's value reaches beyond enterprise inception stages, providing insightful approaches and methods in subsequent stages, e.g., evaluation and expansion (Carella et al., 2023).

Education systems must embrace such hybrid models. As Crescente-Romero et al. (2019) assert, Europe's future competitiveness in the world will depend on creating a new generation of entrepreneurs who can fill employment gaps and create employment. Entrepreneurship education remains imbalanced across the continent. Entrepreneurial mindsets are increasingly promoted in primary and secondary education, yet comprehensive and structured experiences are rare in most national contexts. Fixson et al. (2012) point out that to create future innovators, there is a need to merge business education and design education and devise a formula helpful to dispel current challenges.

Design Thinking integration into business education has emerged as a successful pedagogical method of developing adaptable and creative entrepreneurial competencies.

Its user-centered, iterative, and problem-solving nature differs from traditional linear business planning methods (Daniel, 2016; Sarooghi et al., 2019). DT enables experiential learning settings where students can empathize, ideate, and prototype in real-life contexts (Kremel & Wetter Edman, 2019). Empirical studies demonstrate that incorporating Design Thinking (DT) in entrepreneurial curricula maximally enhances the capacity of students to absorb uncertainty, hence increasing their potential for transforming uncertainty into sustainable opportunities (Linton & Klinton, 2019; Huq & Gilbert, 2017). Unlike the rigidly analytical reasoning that will not fully serve to respond to ambiguous and poorly defined challenges, DT equips students with intellectual tools such as abductive reasoning, analogical mapping, and reframing—to adopt more evolved and versatile means of confronting entrepreneurial challenges (Garbuio et al., 2018).

Despite the increasing efforts for developing entrepreneurial skills from an early age, there still exists a large gap in structured support for skills like creativity, problem-solving, and resilience in many education programs (European Commission, 2016).

Although these qualities are generally recognized as essential for entrepreneurial success, they are still not adequately addressed in standard curricula. In such a context, incorporating Design Thinking into entrepreneurship curricula has become pertinent and imperative. The point where technological disruption, changing job markets, and intricate global dilemmas converge demands a reformulation of pedagogical approaches to entrepreneurship education. Hybrid learning frameworks that balance analytical rigor with creative inquiry can empower the future generation of business leaders to tackle these challenges with empathy, innovation, and agility. By incorporating DT into formalized academic curricula, schools can cultivate professionals capable of handling uncertainty, sensing concealed opportunities, and co-creating value in a way that is attuned to the dynamics of the economy today.

Despite several contributions demonstrating the potential of the intersection of entrepreneurship and Design Thinking courses as an effective pedagogical methodology—and that such programs ought to be further developed—there is scarce research that thoroughly describes these experiences. More precisely, there is a shortage of research that deals with the perceived gains derived from the confluence of these methods in teaching curricula.

This paper aims to shed light on the experience accumulated through the "Design Startup" course of the School of Design of Politecnico di Milano. It will outline the suggested model, merging Design Thinking and Entrepreneurship, and the perceived benefits reported by students who have pursued their entrepreneurial ideas in recent years.

## 2. Storyline and methodology

The Design Startup course is an elective provided to students pursuing the School of Design undergraduate program at the Politecnico di Milano. Available to students pursuing any of the four bachelor's degree programs, the course consists of thirteen four-hour classes. The design orientation of the institution was upheld since the course was explicitly planned to exceed generic business-oriented startup education by providing a solid design-thinking-based approach in the initial phases.

The first part of the course focuses on introducing the students to three core methodologies central to the domain of design: Design Thinking, Design Sprint, and the Lean Startup Methodology. These methodologies are taught in a sequence that provides students with a comprehensive toolset: to first develop empathy for the users; second, to enable quick and creative idea generation; and third, to effectively test

assumptions for ensuring their alignment with users' needs. The teaching curriculum also comprises user interaction techniques and other analytical tools. Students are also provided with a suitably selected set of open-source material, along with specifically tailored material created by the instructors.

The second half of the course turns its attention to management and economics, the basics. Topics include the Business Model Canvas, with particular attention to commonly adopted revenue models in early-stage startups. The students are also introduced to income statement building and analysis to enable them to estimate the point at which a business will break even. Moreover, the course deals with major startup investors' functions and the different legal structures that a startup may follow in its development into a mature business.

From a pedagogical perspective, the course aims to integrate theory with practice to aid in developing entrepreneurial ideas, focusing on a design-based approach, economic viability, and the action steps to establish and develop a business. Each session usually consists of 2.5 hours of course material and a 1.5-hour presentation by founders of startups. These guest entrepreneurs also share their journey—from initial ideation and seed funding through major obstacles they overcame and how they did so. There is also an open Q&A session in each.

Parallel to the lectures, the students have to work on an innovative idea, developing an entrepreneurial pitch. The experiential project challenges the students to use theoretical knowledge in a practical context. All students present their business idea at the conclusion of the course in a three-minute pitch presentation format, thereby simulating an investor presentation.

This study presents an analysis derived from a questionnaire distributed to graduates of the program. It aimed to ascertain their views regarding the course's interdisciplinary nature—combining design and management approaches—and learn about their perceptions of the implemented interdisciplinary education system.

The survey collected 68 responses and employed a mixed-method structure, combining open-ended questions with Likert scale items. Specifically, the questionnaire was divided into three sections: the first aimed to determine how much and why the participants appreciated the course, valuing the educational format; the second explored how they perceived important and integrated the different contents of the course, mainly focusing on the contribution of the Design part into the entrepreneurial one; the last part was related to their evaluation of the course's relevance to entrepreneurial career development. The responses were collected in an Excel file and analyzed using descriptive statistical methods and visual representations (Hays, 1973). The findings were discussed and interpreted by a research team composed of two faculty members and three academic researchers.

## 3. Results and discussion

A comprehensive survey was administered to former students of the Design Startup course. The questionnaire combined both quantitative and qualitative items. It was structured using a 5-point Likert scale to evaluate the extent of agreement with a series of statements. In this context, a score of 1 represented strong disagreement and a rating of 5 represented strong agreement with the suggested claims. Besides this, the questionnaire had multiple-choice questions and open-ended questions intended to validate, triangulate, and expand knowledge of the results obtained from the Likert-scale rating.

Starting with the evaluation of the educational format, overall student feedback was highly positive. Students reported overall satisfaction with the course structure and content, with the overall level of satisfaction rating 4.8 out of 5. Open-ended comments also reflected the perceived success of the format, which was described as a well-balanced mix of theoretical instruction, real-world testimonials, and project-based work. The combination of these elements was repeatedly emphasized as a primary strength that enabled students to link theoretical concepts with real-world relevance, thereby equipping them with a sound basis for entrepreneurial engagement. Students commended the equal representation of design-oriented and business-oriented viewpoints, commenting that this mixture was not only academically challenging but also strategically beneficial, as it allowed them to connect innovative ideas with business viability—two indispensable factors in any entrepreneurial endeavor. About the different external guests, students indicated that these testimonials were especially effective, as they offered genuine, context-filled explanations that complemented the theoretical knowledge. Numerous students indicated that hearing about the risks, uncertainties, and perseverance of actual entrepreneurs made them feel more confident, thereby reducing the fear and uncertainty too commonly linked with the process of initiating a business venture.

The second half of the research was about the relevance of incorporating Design Thinking into Entrepreneurship and how they benefit from the combination. Before the course, most of the students did not envision a conceptual or practical connection between the two fields. Survey data corroborated this observation: students rated their original understanding of design-entrepreneurship relationships at 3.09 out of 5. This understanding, however, underwent considerable transformation during the program. After the

course, the same aspect was rated at an average of 4.68 out of 5, indicating a significant change in the learners' conceptualisation of design approaches as a component of entrepreneurial pursuits.

This transition highlights the framework's success in transcending disciplinary boundaries and acclimating learners to a cross-modal cognitive perspective—blending the empathy, inquiring mindset, and iterative process intrinsic to Design Thinking and the strategic planning, viability evaluation, and scalability considerations intrinsic to entrepreneurship. Students reported that they gained a clearer understanding of how the tools and methods of each discipline might be combined to create robust, innovative, and user-centered business ideas.

The questionnaire also investigated students' perceptions of the significance of Design Thinking in facilitating the creation of new entrepreneurial ventures. The mean score for this factor was 4.2 out of 5, reflecting a broad consensus on its significance. To investigate this factor further, the questionnaire contained a multiple-choice question, requesting students to identify what they perceived as the primary advantages of incorporating Design Thinking into the entrepreneurial process.

The most valued benefit, according to 89% of participants, was being able to discover user needs and utilize these insights for entrepreneurial development. This result aligns with existing literature. For instance, Nielsen and Stovang (2015) posit that integrating experiential entrepreneurship education with the open-minded, empathetic Design Thinking mindset enables students to more effectively grasp unmet needs and develop applicable, human-centered innovations. To this end, the course specifically tackled what CBInsights (2021) recognizes as one of the underlying causes of startup failure: the development of products or services that do not meet actual user demands.

The second benefit, by appreciation value, chosen by 81% of the participants, was the facilitation of innovative and creative problem solutions. The format allowed students, in the view of students, to practice what literature refers to as creative reframing—the capacity to reframe problems and view them from various aspects, resulting in the design of new solutions. This capacity, as noted by Carella et al. (2023), is a distinctive trait of many successful startups and is considered a core capability in uncertain and dynamic business environments.

A third key takeaway from the responses, as proposed by 78%, is the positive observation on the course's role in developing an iterative mindset. The iterative mindset developed from the course enabled participants to prototype rapidly, gather and analyze feedback, and refine their ideas through cycles of refinement or strategic pivoting. As posited by Martin (2009), iteration is one of the fundamental principles in effectively managing the uncertainty and complexity that mark the entrepreneurial environment. Students recognized the value of embracing failure as a learning opportunity and found that doing so was liberating and confidence-enhancing.

Another significant value discovered in the course was the convergence of complementary methods such as Design Thinking, Design Sprint, and the Lean Startup approach. This component was particularly well-received, where the usefulness of discovering the three methods received an average rating of 4.83 out of 5. Students appreciated how the course provided not just conceptual knowledge but also actionable frameworks they could use to structure their innovation processes. Relevant academic contributions further underscore the value of combining these methods. Müller and Thoring (2012) compared Design Thinking and Lean Startup, observing that although they have differing natures, they are both dedicated to user-centered development, test, and iteration. While Design Thinking is more likely to tackle ill-defined, exploratory issues in linear stages (Understand, Define, Ideate, Prototype, Test), Lean Startup is concerned with market-based innovation through a Build–Measure–Learn loop (Ries, 2011).

Understanding the distinctions and complementarities between these approaches enabled students to make informed methodological decisions, depending on the stage and nature of their entrepreneurial projects. The exposure to this methodological plurality was cited as an important factor in developing adaptability, a critical skill for navigating the uncertainties and demands of real-world entrepreneurship. Students felt that learning how to shift between methods and integrate their tools enhanced their ability to deal with diverse entrepreneurial scenarios, from ideation and validation to scaling and business model refinement.

In light of the above, the educational framework proposed and tested in the Design Startup course can be considered a promising prototype for integrating Design Thinking into Entrepreneurship education. Its potential to balance theory, practice, emotional learning, and methodological pluralism provides a solid basis for replication or adaptation within other university settings. The model not only enhances entrepreneurial competencies but also enhances key soft skills such as empathy, adaptability, and resilience.

Nevertheless, a number of future research and development directions arose. One of the main dilemmas is achieving a balance between creativity and feasibility. Although the course was effective in encouraging creative thinking, some students required tools that have the potential to close the vision-execution gap. Future educational interventions can be geared towards creating frameworks in which

students can pursue imaginative exploration without compromising the ability to consider pragmatic constraints and business viability.

Another recurring theme in the feedback was related to decision-making under complexity. While students appreciated the exploratory nature of Design Thinking, some struggled to synthesize a number of insights and choose a strategic direction. A student noted that "the extremely exploratory nature of Design Thinking can occasionally go off on a tangent, and it is easy to lose focus." Future versions of the course may be enhanced by incorporating decision-support tools or heuristic frameworks that enable students to prioritize alternatives and assess trade-offs more efficiently.

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