


Application of new agile approaches at University of São Paulo innovation agency's entrepreneurship and innovation course

Aplicação de novas abordagens ágeis em disciplina de empreendedorismo e inovação da agência de inovação da Universidade de São Paulo

Diane Aparecida dos Reis¹ 
André Leme Fleury¹
Thais Bento²
Katia Fabbri²
Luciane Meneguim Ortega²
Vanderlei Bagnato²

How to cite: Reis, D. A., Fleury, A. L., Bento, T., Fabbri, K., Ortega, L. M., & Bagnato, V. (2019). Application of new agile approaches at University of São Paulo innovation agency's entrepreneurship and innovation course. *Gestão & Produção*, 26(4), e4122. <https://doi.org/10.1590/0104-530X4122-19>

Abstract: Organizations continually look for new ways to generate ideas and to convert them into innovative products and services, a movement that strengthens entrepreneurship. Considering the context of entrepreneurship education, this paper presents and analyzes the main results obtained with the realization of the “7600001 Innovation and Entrepreneurship” course, offered by the University of São Paulo Innovation Agency (AUSPIN), with support of the platform “Bota Pra Fazer”, an Endeavor and SEBRAE initiative. The paper promotes the discussion concerning best practices for the academic diffusion of entrepreneurship education considering the diffusion of the agile approaches (Design Thinking, Lean Startup and Business Model Canvas). It was possible to conclude that the experience with the 7600001 course, with a blended format and project-oriented learning, was adequate to improve the learning of entrepreneurship at the Brazilian academic environment according to the vision of the students involved.

Keywords: Business model canvas; Design thinking; Entrepreneurial education; Entrepreneurship; Lean startup; Universities.

Resumo: O mercado busca novos caminhos para gerar ideias e convertê-las em produtos e serviços, movimento que fortalece o empreendedorismo. Considerando o contexto do ensino do empreendedorismo, este artigo apresenta e analisa os principais resultados obtidos com a realização da disciplina 7600001 Inovação e Empreendedorismo - ofertada pela Agência de Inovação da Universidade de São Paulo (AUSPIN) com apoio do conteúdo da plataforma Bota Pra Fazer, uma iniciativa da Endeavor e do SEBRAE Nacional. Como resultado, fortalece a discussão sobre melhores práticas para o ensino acadêmico considerando a aplicação da abordagem do empreendedorismo baseado em hipóteses, que incorpora os métodos ágeis (Design Thinking, Lean Startup e Business Model Canvas) para a experimentação de um ciclo completo de prototipação de uma startup. Verifica-se, assim, que a experiência da disciplina 7600001, optativa, de formato semipresencial e que aplica a aprendizagem orientada a projetos, mostra-se adequada para a promoção do empreendedorismo no ambiente acadêmico brasileiro, considerando a visão dos alunos envolvidos.

Palavras-chave: Business model canvas; Design thinking; Educação empreendedora; Empreendedorismo; Lean startup; Universidade.

¹ Departamento de Engenharia de Produção, Escola Politécnica, Universidade de São Paulo – USP, Av. Prof. Luciano Gualberto, 380, Butantã, CEP 05508-010, São Paulo, SP, Brasil, e-mail: diane@usp.br; alfleury@usp.br

² Agência USP de Inovação, Av. Torres de Oliveira, 76, CEP 05347-902, Jaguaré, SP, Brasil, e-mail: thais.bento@gmail.com; fabbrikate@gmail.com; luciane.ortega@usp.br; vander@ifsc.usp.br

Received: June 1, 2017 - Accepted: Dec. 13, 2017

Financial support : CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior.

1 Introduction

Organizations continually look for new ways to generate ideas and to bring them into the market. If in the past the Research and Development department (R&D) conducted this process and presented itself as a formidable barrier against the entry of new competitors (Chesbrough, 2003), currently new ventures have been successfully implementing new ideas for restructuring existing business processes (Ries, 2011). Entrepreneurship has proven its ability to transform ideas into innovative products and services, resulting in a large number of new businesses, increasing their relevance to individuals, organizations and for the societies (Neck et al., 2014). However, despite great encouragement, there is still an expressive volume of new ventures that still fail in their initial structuration (Nirwan & Dhewanto, 2015). Entrepreneurial activity is recognized and valued internationally, and its practice is stimulated by governments and corporations (Startup Genome, 2017), demanding new research with focus on the proper development of this process, capable of stimulating the entrepreneurial behavior (Rauch & Hulsink, 2015).

Entrepreneurship education changed during the last decade (Neck et al., 2014) and has no longer as its main focus the elaboration of an extensive business plan, capable of detailing the possible future functioning of a new corporation (SEBRAE, 2013). Due to its complexity, the construction of a business plan demands high dedication to research and to formulate future scenarios, keeping the entrepreneur far from the reality experienced by its potential customers. Considering that this distance was the main cause of failure of many startups, Blank (2005) proposed an approach in which the entrepreneur considers that in an initial moment his business is based only in hypotheses, which must be tested in practice with real customers in order to be validated or not, a concept baptized by the author as GOOB (Get Out of the Building). This approach, in which field validation becomes more valuable than the elaboration of the complete business plan, has established the main foundations of the Hypothesis-Driven Entrepreneurship (Eisenmann et al., 2011), popularized since 2012 and today the main driver of the new approaches for the entrepreneurship education.

Considering this context of transition, this paper contributes with the identification and promotion of the discussion about best practices for the entrepreneurship education in the Brazilian academic environment. The objective is to improve entrepreneurship education, strengthening and disseminating best practices that enable its popularization in different educational institutions, promoting the creation of new disruptive business, capable of bringing more

and better innovations to organizations and for the society.

Entrepreneurship at the University of São Paulo (USP) is promoted, among other actors, by the University of São Paulo Innovation Agency (AUSPIN, 2017), Technological Innovation Center of the University and diffuser of academic innovations. The scope of AUSPIN includes activities related to the protection of intellectual property, the promotion of technology transfer, the stimulation of entrepreneurship and the signing of agreements with other universities. In terms of entrepreneurship, AUSPIN supports the structuring of business between professors, students and employees, participates in the governance of innovation habitats, supports the university's entrepreneurial ecosystem and aligns results with the business sector.

For the dissemination of entrepreneurship, AUSPIN has created and offers every semester for all undergraduate students of the University the course "7600001 - Innovation and Entrepreneurship", which aims to enable students to fully experiment the initial cycle of creating a new business. This cycle includes two main phases: the first phase, with focus on discovering and learning about possible business customers and their most relevant problems, and the second phase, with focus on the development of a Minimum Viable Product (MVP), the initial version of the product and/or service that is being developed and that is presented for evaluation among potential customers, allowing decisions concerning to the continuity of the project (Blank, 2013).

The course is conducted in a blended format and in 2016 it included two hundred and thirteen students from two campuses, São Paulo and São Carlos. In each campus five presentational classes were conducted, when professors and speakers presented the programmatic content, with main focus on the agile approaches for new business development, including Design Thinking, Lean Startup and Business Model Canvas. The course applies the Project-Based Learning approach (Boss & Krauss, 2014), with the main focus on experiencing the first steps of developing a new startup. The "Bota Pra Fazer" platform, developed and operated by Endeavor - a global reference in supporting high-impact entrepreneurs (Endeavor, 2017) in partnership with SEBRAE, complemented the educational process providing video lessons and tasks related with new business development.

This paper presents the main results and learnings obtained with the realization of this course and analyzes the relevance of this new approach to teach entrepreneurship considering students' responses to a reaction questionnaire and also the relevance of the projects developed during the semester. The structure of the paper includes a literature review concerning the scenario of entrepreneurship education and the subjects of interest addressed in the course (Design Thinking,

Lean Startup and Business Model Canvas). The method of the research is presented below. Considering the projects elaborated in the course, the paper presents the students' results and the reaction questionnaire, applied at the end of the course. Finally, from the alignment of the different conceptual and practical aspects explored throughout the paper, answers are offered for the motivating questions of the study.

2 Literature review

In order to analyze the results of the “7600001 - Innovation and Entrepreneurship” course, it is necessary a better understanding of entrepreneurship education and its typologies, allowing to contextualize the course in relation to the state of the art, a theme presented in the first part of this literature review. In order to make possible the establishment of frameworks of best practices for entrepreneurship education, the second part of the literature review presents the construction and conceptualization of the content that directed the development of the projects, based mainly on the agile approaches (Design Thinking, Lean Startup and Business Model Canvas).

2.1 Entrepreneurship education

Many countries invest in entrepreneurship education as a way of encouraging entrepreneurial activity, and there are evidences of the positive relationship between entrepreneurship education and entrepreneurial intent (Souitaris et al., 2007; Sánchez, 2013). If, in the 1970s, the diffusion of microcomputers accelerated the ability to operate businesses and reduced critical points such as scale and costs, facilitating the creation of new varied business (Vesper & Gartner, 1997), currently entrepreneurship is associated with high levels of economic growth and generation of innovations (Sánchez, 2013; Rauch & Hulsink, 2015).

In general, entrepreneurship education has focus on the development of the skills and competences required for entrepreneurs (Sánchez, 2013; Rauch & Hulsink, 2015; Oosterbeek et al., 2010), influencing their success (Robinson & Sexton 1994). The results obtained with these initiatives are usually evaluated by measuring the degree of entrepreneurial intention after contact with the educational programs (Oosterbeek et al., 2010; Souitaris et al., 2007). Therefore, entrepreneurship can be taught as a method, a certain way of acting and thinking, based on certain techniques to create assumptions, supposing that students will exercise it in practice, and it can also be taught as a process, characterized as a predictable process (Neck & Greene, 2011).

Neck et al. (2014) propose five practices that should be observed in entrepreneurship education: the practice of play, the practice of empathy, the practice of creation, the practice of experimentation,

and the practice of reflection. The different schools of entrepreneurship present different views on topics such as innovation, growth, management and business creation, highlighting the relevance that the different initiatives have their results measured, especially their impact with students, organizations and society, since the entrepreneurship education is not fixed, requiring constant debate and dialogue (Vesper & Gartner, 1997). Entrepreneurship courses can begin with a deeper understanding of their nature and purpose (Piperopoulos & Dimov, 2015), in order to predict the results that can be achieved (Neck & Greene, 2011).

2.2 Agile approaches to entrepreneurship education

Hypothesis-Driven Entrepreneurship helps in the reduction of the great risk that a entrepreneur may offer products and/or services that are not aligned with the needs and desires of customers, bringing the entrepreneur's vision to identify the hypotheses on which the new business is rooted, which must then be tested with potential customers for evaluating and acquiring knowledge capable of confirming or changing the initial idea, carrying forward only products and/or services that have been proven to be aligned with market demands (Eisenmann et al., 2011). The Hypothesis-Driven Entrepreneurship approach considers that practical validation is more valuable than the elaboration of a complete business plan and is currently the main driver for the new approaches for entrepreneurship education. Figure 1 presents the main concepts covered throughout the course “7600001 - Innovation and Entrepreneurship”.

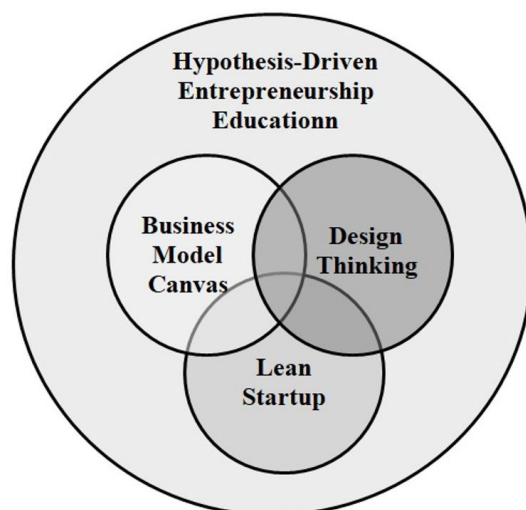


Figure 1. Main concepts addressed in the course. Source: Authors.

In this context, entrepreneurship education at the “7600001 - Innovation and Entrepreneurship” course is composed by the combination of the following approaches: Design Thinking, with focus on the detailed understanding of the reality experienced by the end customer in order to generate innovative ideas, capable of resulting in differentiated projects; Lean Startup, which promotes the development of products and/or services that are validated considering the needs and desires of potential customers, contributing mainly with the development of the initial prototypes; and Business Model Canvas, which contributes to the development of projects with the design of business models in a simple, complete and structured way. This course approach is aligned with the “Startup Garage” approach, promoted at the Stanford University Business School, which includes the steps of exploration, immersion, formulation of customer needs, ideation, prototyping, testing, design and testing.

Therefore, the approach practiced in the course “7600001 - Innovation and Entrepreneurship”, starts with the identification of the public of interest, followed by a detailed process of immersion, aiming to identify the main difficulties experienced by this public. These difficulties are then summarized in a sentence that articulates the main needs identified and that will guide the process of ideation and creation. The selected ideas are then prototyped and tested with the audience of interest. If the tests result in evidences that suggest the development of the business, the entrepreneur advances to complete the startup structuration.

2.2.1 Design thinking

Design is an fundamental human activity, combining intuition, rationality and creativity, possessing the essence of a multifaceted nature (Lawson & Dorst, 2013). Design acts as a humanizing activity for technological innovations and plays an important role in cultural and economic exchanges (ICSID, 2017). Therefore, the designers’ activity is considered different from other professional activities, incorporating different and particular methods for solving complex problems, whose solution is usually based on the tacit knowledge of the designer (Cross, 2006). Therefore, the main focus of the design activity is to solve complex problems based on the deep understanding of the individual’s experience (Buchanan, 1992). It is characterized as a creative process, difficult to study because it does not occur according to a previously determined and understood process (Dorst & Cross, 2001).

Design Thinking (DT) is defined by Brown (2008) as an approach that applies the methods and the sensitivity of the designer to obtain solutions that correspond to what is desired by the customers, technologically feasible and that can result in interesting business

models. The DT is an approach that promotes the generation of innovation by identifying the most relevant difficulties faced by a particular segment of customers (Brown, 2008). Solving these difficulties is the objective of the resulting products, services and processes, enabling strategies with superior value. Therefore, in the context of contemporary entrepreneurship, DT becomes valuable because it allows for the new venture to be originated from the identification of relevant needs of a particular public of interest for the entrepreneur (Neck et al., 2014). According to Brown (2008), a designer applies the DT observing reality in detail, searching for interesting problems to solve, elaborating creative solutions, constructing prototypes that enable their validation with potential customers, collecting relevant opinions and exposing the generated innovation at the potential market.

Brown (2008) states that the DT process consists of three main phases, which must be executed several times, during different iterations, in order to refine the solutions under development and to allow the identification of other possible directions for the project: inspiration, that is, the identification of the circumstances that motivate the search for new solutions; ideation, that is, the development and prototyping of ideas of potential solutions; and implementation, that is, the search for ways to take the solutions to the market.

It is observed that DT is not a linear process of steps to be strictly followed (Fleury et al., 2016) and, according to Grotti et al. (2016), during the development of the project the designer can apply techniques such as observations, with the purpose of observing users in their natural environment, capturing details and wide perspectives of this universe; interviews, which search to understand the motivations, desires and needs of the users through conversations; personas, that express the main archetypes identified in the information gathering; affinity diagram, organizer of large amounts of information obtained from the field work; and prototyping, in order to materialize the solutions.

2.2.2 Lean startup

A startup is an organization created to establish a replicable and scalable business model (Blank & Dorf, 2012), adopting a strategy focused on developing new products and/or services under conditions of extreme uncertainty (Ries, 2011). When success happens in the search for the new business model, it is possible to create a relevant organization, that could not be created by the traditional market players (Thiel, 2014). However, according to Arruda et al. (2013), 25% of the startups fail in less than a year; therefore in order to reduce this high mortality rate,

a new approach emerged and popularized because of its ability to optimize the process of starting a new business: the Lean Startup (LS), whose essence is the search for a successful business model with less focus on planning and greater focus on the formulation of hypotheses to be tested with potential customers (Blank, 2013).

According to Järvi et al. (2015) and Ries (2011), LS methodology has emerged at software development organizations and has spread rapidly because of its ability in eliminating waste throughout the creation, acceleration and evolution of startups. Its application was diffused at Eric Ries's blog, "The Lean Startup", since 2008, and its application is already on the curriculum of renowned educational institutions such as Harvard, Stanford and Columbia, and companies such as Qualcomm, Intuit and GE (Anderson, 2012). Lean Startup's methodology is based on Hypothesis-Driven Entrepreneurship, in which the opinions of potential customers are collected in the search for the development of only products and/or services with market demand (Eisenmann et al., 2011).

LS, according to Ries (2011) and Karlsson & Nordström (2012), is a new approach, based on agile management models and product development frameworks, that continually foster the creation of innovations. It has as its main focus minimizing the risk of the new business failure after a high consumption of resources such as time and money. For that, it performs short learning cycles and applies agile tests that validate the project's guiding ideas (Ries, 2011), working for the entrepreneurs' success (Nirwan & Dhewanto, 2015) and turning the new business vision into prototypes that can be tested and validated with customers (Rasmussen & Tanev, 2015). Learning from the validation and prioritization obtained with the customers become the great drivers for the development of the innovations, based on their opinions, allowing the structuration and validation of adjustments, creating value for customers and eliminating waste during the creation phase, assisting in the refinement of the products and/or services that should be created (Edison, 2015).

For Blank & Dorf (2012), the initial structuration of a startup mainly includes the development of its first products and/or services and the establishment of the initial business relationships. According to the authors, the evolution of a startup includes four main phases, summarized in Figure 2.

The realization of each phase is based on the validated learning process, proposed by Ries (2011) and presented in Figure 3, in which the creation of the startup happens in an iterative way and, in each cycle, hypotheses are created and tested with customers. If the hypotheses are considered true, then the entrepreneur must proceed; on the other hand, if the hypotheses are not confirmed, the entrepreneur

must search a new path and develop new hypotheses, which will be tested again in the next iteration.

One of the ways for the startup to test the identified hypotheses is creating a Minimum Viable Product (PMV), which enables the tests to be performed and acts as a tool for deciding about the construction or not of the new products and/or services (Ries, 2011; Croll & Yoskovitz, 2013). According to Ries (2011), Anderson (2012) and Blank (2013), the PMV is a product or service version that allows the validation of learning.

2.2.3 Business Model Canvas

The beginning of a new business is complex, specially in its early stages, when the product and/or service to be offered is under development and the best value proposition is still being searched (Trimi & Berbegal-Mirabent, 2012). According to the authors, the development of business models assist entrepreneurs in making decisions, providing information, validation tools and the identification of new opportunities, increasing the chances of new business success.

According to Osterwalder & Pigneur (2011), business models describe the logic of how an organization creates, delivers, and captures value, and the Business Model Canvas (BMC) graphically represents an organization's business model with simplicity and

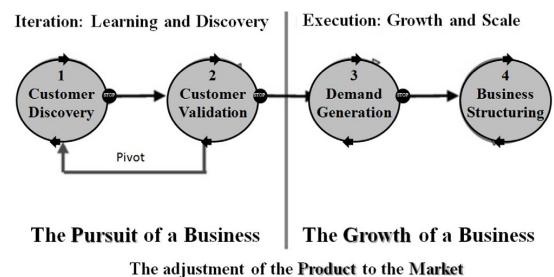


Figure 2. The four phases of startup development. Source: Blank & Dorf (2012).

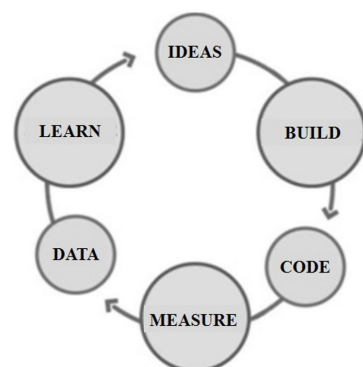


Figure 3. Process of validated learning. Source: Ries (2011).

flexibility, having big applicability in startups. BMC most traditional framework is presented in Figure 4.

For Farina (2017), the BMC is a useful approach to perform different analysis, graphically schematizing the logic of how a business creates value for its customers, evidencing relationships and the business logic, allowing the identification of the most relevant points for the delivery of superior value to customers and establishing organizational competitive advantages. According to Osterwalder & Pigneur (2011), Banchieri et al. (2013) and Martikainen et al. (2013), BMC makes it easy to describe the business model, graphically summarizing its logic, presenting only relevant content for the initial steps of the venture, whose design enhances the constant reflection on the most important decisions related with the environment, evidencing the relationships between its elements and their articulations in different fields, such as a manual that facilitates even the organizational search for strategic alternatives.

3 Methodology

In order to contribute with the identification and promotion of the discussion about best practices for entrepreneurship education, a case study was conducted with the objective of registering, measuring and analyzing the results obtained by the students in the course “7600001 - Innovation and Entrepreneurship”, promoted by AUSPIN, with a blended character, taught in the campuses of São Paulo and São Carlos, in the second semester of 2016, making possible the comparison of the effectiveness of the entrepreneurship learning in the scenario of analysis.

Case study is a strategy of research that focus on understanding the dynamics of the present, with an

unique configuration and combination of methods for data collection such as interviews, questionnaires, observations, and secondary research, obtaining quantitative evidences and/or qualitative evidences (Eisenhardt, 1989). Case study provides an understanding of the real world, in which the analyzed events cannot be manipulated by the researcher (McCutcheon & Meredith, 1993). Case studies allow the construction of generic models (Martikainen et al., 2013), investigating decisions (Choudhari et al., 2012) and allowing a better understanding of the present in the real context, thus presenting an appropriate format for the understanding and analysis of entrepreneurship education initiatives.

For the development of the case study a reaction questionnaire was applied with the students, whose participation was optional. The questionnaire had an initial section for sample characterization and a second section for course evaluation; this section consisted of twelve structured questions and five questions related with the presential meetings, incorporating closed options to evaluate each meeting (totaling five questions) and open questions to incorporate student comments (totaling another five questions). All the data were analyzed quantitatively and qualitatively.

In order to conduct the analyzes related to the case study, the developed projects were classified according to their level of technological uncertainty, relevance to the customer considering the identified needs and the capital required to start the venture operation (without considering advertising). The analysis of the quality of the final delivery considered the results obtained at the two initial phases of the project, conducted according to the model proposed by Blank & Dorf (2012): “Customer Discovery” and “Customer Validation”. Each of these phases was

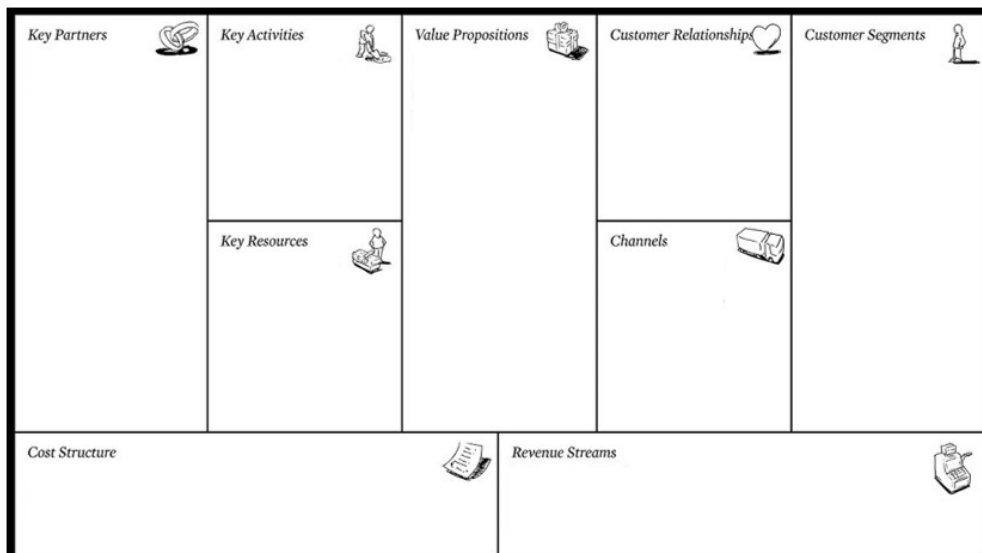


Figure 4. Business Model Canvas. Source: Osterwalder & Pigneur (2011).

divided into two stages, resulting in a total of four stages that were evaluated according to the results obtained in relation to the predicted scope, as can be observed in the Table 1.

For each stage being evaluated a certain group of criteria was considered, directing the evolution of the projects in order to reinforce its final results and generating a comparative base (partial evaluations and final evaluations).

Customer Discovery: in the **first stage** the groups of students search for relevant problems, identifying the challenge they wish to address. Aiming to obtain the first ideas of the business models, groups identify their potential customers and their most relevant problems, applying observation and interviews techniques. In this step, the deliveries are evaluated with grades from 0 to 10: a) description of the context and the opportunity of interest, justifying its originality and relevance; b) realization of interviews with potential customers; c) observation of the context of the problem, highlighting main activities, spaces, interactions, objects and users; and d) the group's considerations regarding the results of interviews and observations, which may or may not lead to the first project pivotal. In the **second stage** the groups structure the business model proposal using the Business Model Canvas (BMC). Thus, the business model should be proposed and the assumptions of its functioning and viability analyzed. Using the validated learning cycle (Figure 2) proposed by Ries (2011), the hypotheses must be tested and obtained learning must be applied for planning the next steps. The points evaluated with grades from 0 to 10 are: a) graphical representation of the business model, including description, analysis and justification; b) hypotheses and tests suggested for each of the nine BMC blocks; c) test results - qualitative or quantitative - performed and d) analyzes and considerations based on the tests performed.

Customer Validation: in the **third stage** the focus is on the development of the first Minimum Viable Product (MVP), that is, the first testable sketch of the imagined project result, applying the main Design Thinking synthesis tools: affinity diagram, personas, empathy map and user journey. A MVP can be structured as a physical or as a digital artifact,

as long as it incorporates some of the key features imagined as interesting for the potential customers. The objective is to develop a MVP that incorporates the functionalities that will be tested with customers. Evaluation considering a scale from 0 to 10 included: a) main MVP concepts/functionalities; b) presence and clarity of the value proposition; c) development plan of the MVP and d) MVP itself (content and form). Finally, in the **fourth stage** the focus is to conduct the tests of the MVP with potential customers aiming to validate (or not) the hypotheses and to measure the formal interest of the customers in relation to the product and/or service. Evaluation from 0 to 10 include: a) main hypotheses and tests that will be conducted; b) achievement of test plan and c) tests themselves and obtained results.

4 Results

This section presents the results of the reaction questionnaire and the evaluation of the quality of the projects developed during the course, considering the students' learning in relation to the entrepreneurship education initiative. The focus is to evidence most relevant results considering the replication and comparison of possible results in future contexts.

4.1 Course reaction questionnaire

At the end of the semester a course reaction questionnaire was sent to the 213 students who participated, being 122 enrolled in São Carlos and 91 in São Paulo. From the 213 invited students 72 returned and, therefore, the rate of return was 33.8%. Most respondents (62.5%) attended the course in São Carlos and more than half of the respondents (54.2%) affirmed that they did not know about other courses with similar focus on entrepreneurship conducted at their schools of origin. Due to the format of the course being oriented to the development of projects, with class credits and work credits, 65.3% of the respondents considered that they dedicated themselves more to this course than to other electives courses that they had already attended. The majority of the respondents (89.7%) considered the course proposal to be appropriate or very appropriate, with a greater emphasis on the generation and validation of business models.

Table 1. Analyze steps for the course final delivery.

Projec Phase	Stage	Objective
Customer Discovery	Stage 1	Understand the context of the problem performing interviews and observations with the target audience and applying the synthesis tools.
	Stage 2	Elaboration of the first proposal of the business model, using the Business Model Canvas approach.
Customer Validation	Stage 3	Creation of the first Minimum Viable Product (MPV).
	Stage 4	Test of the MPV with the target audience and analysis of the obtained results.

Source: Authors.

According to the students the positive aspects of the course were: introduction to concepts and methodologies applied in the projects and used for entrepreneurship; strengthening or creation of a knowledge base in entrepreneurship; possibility and incentive to test proposals quickly and to verify their adherence to potential customers; face-to-face feedback with teachers or monitors; network with students from other courses; contact with entrepreneurs and their experiences; greater sense of security for future business. The negative points were: scarce time, mainly due to the small number of presential classes (5 classes); lack of deepening in some specific contents; impossibility of access to the platform “Bota Pra Fazer” after the end of the semester; few support material beyond the platform content; difficulties with the groups - group formation and maintenance, dropout of students during the semester, students who did not know each other previously; difficulty in managing the course’s activities. Although several points of improvement have been identified, the final result of the experience was considered positive, since for 77.8% of the respondents the willingness to create a startup increased after the experience with the course and 93.1% affirmed that they would recommend the course for other students.

4.2 Projects presentation

The ten best projects presented at the end of the course were selected by an examining board, constituted by evaluators from USP, SEBRAE and also market experts. These 10 projects are presented below.

4.2.1 Shared security app

This is a business that aims to minimize the serious security problem by creating an app. The benefits provided with the system include the sharing of camera images, owned by participating users, which can be accessed by any user (See Table 2).

4.2.2 Phone charger

It is a business with high potential impact, combining nanotechnology and sustainability. A suggestion to the project was the elaboration of an estimation of cost, since, besides the expenses with the product development, the technology used already exists in the market, being able to be used in systems of cars departure and exit emergency doors of airplanes (See Table 3).

Table 2. Shared security app.

Shared security app	
Class	São Carlos
Objective and target audience	App that aims to make public spaces more secure. A map records events and generates statistics of hazardous locations and dangerous hours; users can ask for help (police and security) and alert facts happening in real time; the cameras installed in the locations can be accessed by the app.
Value proposal	A) Increase the population security at an affordable price; B) Alerting for hazards and allowing rapid response; C) Allowing intelligent monitoring and tracking, integrated and in real-time.
MVP	App screens, simulating its operation.
Validations made	There was no validation.

Source: Authors.

Table 3. Phone charger.

Phone charger	
Class	São Carlos
Objective and target audience	Produce portable cellular chargers with a life cycle 100 times superior to the conventional batteries, starting from the transformation of waste into nanomaterials. It deals with the problem of the mobile phone lack battery users and reduces the amount of toxic solid waste produced by society.
Value proposal	A) Sustainable (absence of heavy metals in the composition of chargers, reducing toxic waste and pollution by incineration); B) Heal the problem of users lack battery; C) Rapid charging (40% charge in seven minutes); D) Light and compact design.
MVP	Product landing page about the product that the group want to develop.
Validations made	105 page access and 84 (80%) clicks on the “Buy” button.

Source: Authors.

4.2.3 College choice

The proposal is to create a channel of communication between college entrance and universities, being able to offer information and career opportunities to college entrance and propaganda to universities. It is believed that the website has not been well developed (low number of access and a page with little information to the users at the time of first access), suggesting to the entrepreneurs that they first provide relevant information to the users and then request their e-mail address (See Table 4).

4.2.4 Digital manufacturing machine

It was suggested to entrepreneurs not only to cite but to detail the business focus (fine milling) in order to present more information as well as their differential in relation to the competition: for example, to justify how the machine would be more accurate and faster in the process or even produce a product (such as making a sheet metal hole) so that the quality of the machine could be analyzed by potential customers (See Table 5).

4.2.5 Alcoholic beverages

It was pointed out to the entrepreneurs that, in addition to the landing page creating, it is important that they also prototype the beverage machine, in

order to test their acceptance with potential customers, allowing the quality evaluation of the product offered (See Table 6).

4.2.6 Tours app

A favorable aspect to the business is the existence of a large target audience: lonely people. The entrepreneurs were suggested to focus on validation, trying to understand if people would use the application, because only were collected opinions related to the screens characteristics application (See Table 7).

4.2.7 Travel bag

This product avoids lost luggage and makes travelers life easier for those who do not need to carry a lot of luggage. Its functional prototype was created and presented at the end of the course and was very well evaluated (See Table 8).

4.2.8 Education evaluation app

The group proposes that students should constantly evaluate professors at educational institutions. Evaluations similar to the proposal of this project already exist in preparatory entrance exam courses and, although the objective to evaluate the class can improve its quality, the environment can become

Table 4. College choice.

College choice	
Class	São Paulo
Objective and target audience	Electronic platform for sharing information about educational institutions, providing information such as location, costs and course characteristics. Assists the students in choosing the educational institution that they will attend.
Value proposal	A) Provide systematized information on higher education for college students; B) Provide greater security when choosing the university career; C) Establish a communication channel between universities and students.
MVP	Webpage creation for the preliminary registration of potential users.
Validations made	Two pages were created: one on the internet, with some information about the services that the platform would provide, and another on Facebook to publicize the previous one. Despite the efforts of the group, there were few accesses.

Source: Authors.

Table 5. Digital Manufacturing Machine.

Digital Manufacturing Machine	
Class	São Carlos
Objective and target audience	Assembly and sale of a digital manufacturing machine, based on the traceability and control of the displacement of the material. The equipment will act by repeating what is sent to it. Currently the technology is used in the manufacturing of drills, milling cutters and three-dimensional printers.
Value proposal	A) Customization options; B) Process speed and precision.
MVP	A computer system with three drive shafts, control and communication systems, motor controller hardware, software, displacement motors and guides for motion transmission.
Validations made	The project entrepreneurs contacted two companies and both were interested in acquiring the machine.

Source: Authors.

Table 6. Alcoholic beverages.

Alcoholic beverages	
Class	São Carlos
Objective and target audience	Offer high quality and affordable microdistillates made with Brazilian botanists.
Value proposal	A) National product of high quality; B) Affordable price; C) Attractive design.
MVP	Landing page creation.
Validations made	The numbers obtained with the page spread were: 58 visits, 53 likes on Facebook and 9 subscribed to receive information of the drinks.

Source: Authors

Table 7. Tours app.

Tours app	
Class	São Carlos
Objective and target audience	Kind of Tinder (app) for non-romantic purposes. The target audience is people who search companionship for recreation.
Value proposal	Provide company for fun quickly and safely.
MVP	Screens that simulate the app, where the compatibility between the individuals is considered in the tours scheduling.
Validations made	The screens were printed and exposed to potential users, searching interactions and suggestions, allowing the improvements development.

Source: Author.

Table 8. Travel bag.

Travel bag	
Class	São Paulo
Objective and target audience	Optimize a light backpack that fits in the airplane cabin for the purpose of dispensing large suitcases. The target audience includes travelers who do not need to carry a lot of luggage, such as young people traveling for short periods and executives or speakers who usually travel with only one handbag.
Value proposal	A versatile backpack with multiple dividers to make traveler life easier.
MVP	A web page was created to promote the product and was built the first backpack physical prototype.
Validations made	The page was shared on blogs and got good acceptance.

Source: Authors.

stressful to the professors, disrupting the education quality (See Table 9).

4.2.9 Recycling of electronic devices

The project is innovative for the Brazilian reality since the service of materials collection and separation is already conducted abroad. However, due to the difficulty of sending solid waste to other countries and receiving back the extracted raw material or sell it, it can be said that there is market potential to this business (See Table 10).

4.2.10 Water treatment

The project has been developed for a company that is starting its operation at the market and, for this reason, it was suggested for the entrepreneurs

the setting of goals, such as the number of customers desired for the next year and plans on how to reach them (See Table 11).

4.3 Projects taxonomy

In order to make possible a better analysis of each project status and its need for future developments considering its effective implementation, a project taxonomy and its variables is proposed in Table 12 and the results obtained with the classification of the projects are presented in Table 13. This taxonomy is based on the concepts proposed by IDEO (2012), according to which a solution presents itself as promising when it is desirable, that is, presents clear value to its potential customers, when it is technically feasible, that is, possible to be developed and when

Table 9. Education evaluation app.

Education evaluation app	
Class	São Carlos
Objective and target audience	Real-time classroom evaluation app. The target audience includes professors and students, with professors getting real time feedback about their classes and being able to improve them.
Value proposal	A) Provide the managerial view of education to the course coordinators; B) Promote class improvement through rapid feedback from students.
MVP	Application screen where the teacher receives student feedback.
Validations made	There was no validation.

Source: Authors.

Table 10. Recycling of electronic devices.

Recycling of electronic devices	
Class	São Carlos
Objective and target audience	It has the purpose of separating materials that are still useful, such as raw material for the industries.
Value proposal	A) Collect electronic devices offering benefits in return; B) Recycle electronic devices and sell the metals extracted from them; C) Reduce environmental impact.
MVP	Offer service of collecting boards, printed circuits and components separation for companies.
Validations made	There was no validation.

Source: Authors.

Table 11. Water treatment.

Water treatment	
Class	São Paulo
Objective and target audience	The microenterprise will conduct water treatment, developing and implementing treatment systems in commercial and residential condominiums, and small and medium-sized industries. The entrepreneurial idea is to redesign processes and deploy technologies.
Value proposal	A) Advantages to the customers towards the local concessionaire; B) Greater independence; C) Improved water quality; D) Financial economy; E) Capacity to monitor the process.
MVP	The main product offered is a mini WTS (Water Treatment Station) installed at the obtaining and using place of water. The purpose is to provide clean and quality drinking water as an alternative source, independent of the local utility.
Validations made	Research was conducted with potential customers that suggested improvements, with the process monitoring implementation, allowing the real-time data monitoring about the water quality.

Source: Authors.

Table 12. Taxonomy variables.

Taxonomy variable	Description
Level of technological uncertainty	It is related with the risk of concretely obtaining the technology required to execute the project.
Customer relevance considering their unattended needs	It addresses the project relevance in terms of attending the identified customers latent needs.
Capital need to start operation (no advertising)	Identifies the capital need degree to start the project operation, without considering advertising revenues.

Source: Authors.

it is financially feasible, that is, when the solution is able to bring financial return to the developer organization.

Observing Table 13 it is possible to conclude that most of the resulting projects present low technological uncertainty and, in this way, it they are possible to be executed considering existing technologies. Only the Phone Charger and Digital Manufacturing Machine projects require technological maturation and, in this way, its evolution must consider this development period. About the relevance of unknowing customer needs, the vast majority of projects address non-priority needs. Regarding the startups capital requirement for start operations, about half of the projects do not require high capital and the other half needs bigger investments.

4.4 Results discussion

The initiative to conduct a course combining students from different schools of the University of São Paulo (USP), applying and analyzing the effectiveness of the Hypothesis Directed Entrepreneurship approach and promoting the discussion about the best practices for its diffusion generated very positive results. As previously mentioned, when asked about the course’s proposal to have a less theoretical focus and a greater emphasis on the generation and validation of business models, 90.3% of the respondents considered the approach appropriate or very appropriate.

Among the main positive points highlighted by the students are the possibility of putting ideas into practice and verifying in the field their applicability, as proposed by Blank & Dorf (2012) through the GOOB (Get Out of the Building) concept; to have a first contact with the entrepreneurship universe, defended by Blank & Dorf (2012); to have contact with students from different USP courses, aligned with the multidisciplinary proposed by IDEO (2012); and promoting a deeper understanding of

the steps for creating new products and/or services and diffusing them into the market (Blank, 2013). Some students also expressed interest in evolving the projects created at the course. Concerning the interest in the entrepreneurial activity, 77% of the students showed a greater willingness to start new ventures after attending the course. It is worth noting that this number is common in the entrepreneurial journey, which can be understood as a funnel, which begins with a larger number of students in the sensitization phase and decreases throughout the journey, decreasing even more in the beginning phases of the enterprise and growth, as is illustrated in Figure 5 (Endeavor, 2017).

The blended format, with only five presential meetings, was considered the course weakest point. In relation to the number of meetings, 48.6% of the students considered that a greater number of presential meetings would be more appropriate, evidencing the demand for the groups attendance, enabling the incorporation of reflexive practice based on practical experimentation in the course context (Neck et al., 2014).

Another aspect mentioned by the students was the process of formation of the groups, since not all the members presented the same motivation and involvement with the project, aspect that remains very challenging for this course. In addition, the optional and blended character of the course is credited with a significant dropout rate, evidenced by the non-delivery of 22.2% of the final projects of the São Paulo class and 9.5% of the São Carlos class.

Still, for 77% of the respondents willingness to entrepreneur increased after the course and 93.1% affirmed that they would recommend the course to other students, a very significant proportion considering the course elective characteristics, with presential meetings on Saturdays and with a considerable volume of activities and deliveries. Based on the evaluation of the entrepreneurship education by the

Table 13. Projects classification.

Projects	Level of technological uncertainty	Customer relevance considering their unattended needs	Capital need to start operation (no advertising)
Shared security app	Medium	High	High
Phone charger	High	Medium	High
College choice	Low	Medium	Low
Digital Manufacturing Machine	High	Medium	Medium
Alcoholic beverages	Medium	Low	Medium
Tours app	Medium	Low	Low
Travel bag	Low	Medium	Low
Education evaluation app	Medium	Low	Low
Recycling of electronic devices	Medium	High	High
Water treatment	Medium	Medium	High

Source: Authors.

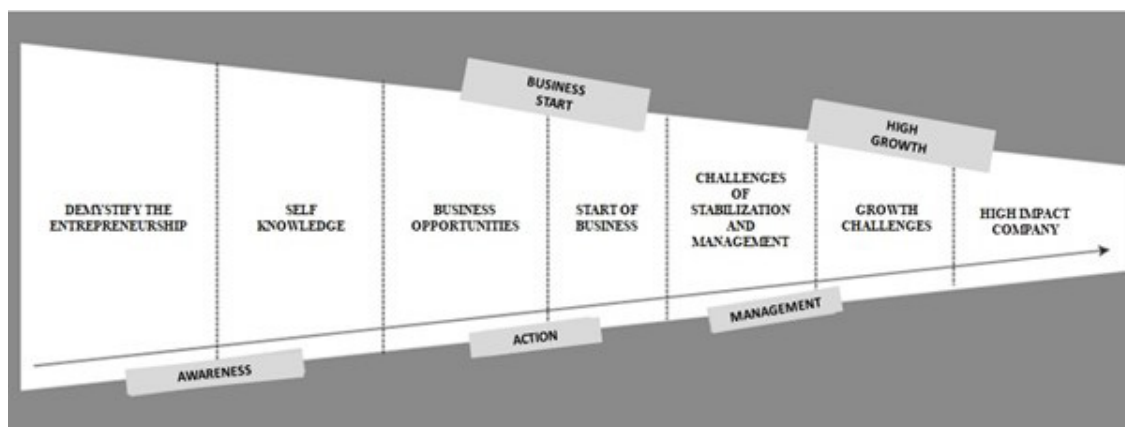


Figure 5. Entrepreneur journey. Source: Adapted from Endeavor (2017).

entrepreneurial intention increase of the participants of programs and course related to the field, such as it is presented in the literature review, it is possible to conclude that the course helps in the identification of the best practices for the promotion of entrepreneurship education in the Brazilian academic environment and contributes with the proposed taxonomy to classify the projects presented at the end of the course, since no similar taxonomy was found in the literature, taking into account questions of technological uncertainty, needs of unknown customers and capital needs for operation.

5 Conclusion

Morin (2000), one of the main contemporary philosophers, highlights that knowledge cannot longer be considered a ready tool and that it is always threatened by error and illusion. For twenty years, entrepreneurship was taught as a ready tool, which search to follow abstract conceptual models to implement new concrete business models (Neck et al., 2014) and, as a consequence, the results usually did not meet expectations. However, the application of agile methodologies (Design Thinking, Lean Startup and Business Model Canvas) for the creation of new products, services and structuring of new business transformed the entrepreneurship education approach, allowing the practical application of its concepts and, for the students, the possibility to experience in the real world the viability of their ideas and projects. Thus, the student can, at the beginning of their project, find errors in their assumptions and try new ways to pursued in the search for the desired business model.

The entrepreneurship education with the application of agile approaches, as seen in the case studied, enables the student to experience and to appropriate knowledge, since it has to be situated in a context for the development of new products and services from the identified opportunities along with the costumers, connecting different answers in order to establish

the business model overall logic. It also requires students to work in multidisciplinary teams from different University units and, finally, to face the high complexity involved in structuring a new business.

In this way, it has been verified that this new form of entrepreneurship education, in which the learning is guided by the project and by the developed hypotheses, leads the students to experience a new set of educational experiences. In this way, students were presented to new ways of creating new startups and, moreover, made possible the decision to continue or not to evolve with the project. This initiative strengthens the capacity to generate innovation in the context of the university and facilitates its market incorporation in the form of startups, or in the companies, that come to have access to professionals who effectively understand how to establish new business starting from the development of new products and services, as suggested by Bagnato (2012).

It has been also observed that the course is aligned with different practices of entrepreneurship education, such as empathy, creation, experimentation, play, and reflection, defended by Neck et al. (2014) and not aligned with the traditional detailed development practice defended by SEBRAE (2013). Based on the evaluation of the students and the quality of the final projects delivered, the blended format, with project-oriented learning focused on agile approaches to the course, was adequate to promote entrepreneurship education, fulfilling its role of discuss and identify best practices for the entrepreneurship promotion in the Brazilian academic environment and helping to understand the entrepreneurship education, generating ideas that can be implemented with potential market.

References

- Anderson, J. (2012). Lean change: enabling agile transformation through lean startup, Kotter and Kanban: an experience report. In *Proceedings of the 2013 Agile Conference*. USA: IEEE. <http://dx.doi.org/10.1109/AGILE.2013.22>.

- Arruda, C., Nogueira, V., Cozzi, A., & Costa, V. (2013). *Causas da mortalidade de startups brasileira*. Rio de Janeiro: Fundação Dom Cabral. Retrieved in 2017, February 9, from https://www.fdc.org.br/blogspacodialogo/Documents/2014/causas_mortalidade_startups_brasileiras.pdf
- Bagnato, V. S. (2012). Inovação: da teoria à prática. In S. Perussi Filho, & V. S. Bagnato, & W. Bar (Eds.), *Caminhos da inovação – a visão de cientistas, educadores, empreendedores e agentes de inovação* (pp. 19-33). Rio de Janeiro: Editora Compacta.
- Banchieri, L. C., Blasco, M. J., & Campa-Planas, F. (2013). Auto evaluación de la gestión por parte de pequeñas empresas y microempresas: estudio exploratorio. *Intangible Capital*, 9(2), 477-490.
- Blank, S. (2005). *The four steps to the epiphany - hardcover*. USA: K & S Ranch.
- Blank, S. (2013). Why the lean startup changes everything. *Harvard Business Review*. Retrieved in 2017, February 9, from <https://hbr.org/2008/06/design-thinking>
- Blank, S., & Dorf, B. (2012). *The startup owner's manual*. USA: K & S Ranch.
- Boss, S., & Krauss, J. (2014). *Reinventing project-based learning*. Washington: ISTE.
- Brown, T. (2008). Design thinking. *Harvard Business Review*. Retrieved in 2017, February 9, from <https://hbr.org/2013/05/why-the-lean-start-up-changes-everything>
- Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues*, 8(2), 5-21. <http://dx.doi.org/10.2307/1511637>.
- Chesbrough, H. W. (2003). The era of open innovation. *MIT Sloan Management Review*, 44(3), 35-41.
- Choudhari, S. C., Adil, G. K., & Ananthakumar, U. (2012). Exploratory case studies on manufacturing decision areas in the job production system. *International Journal of Operations & Production Management*, 32(11), 1337-1361. <http://dx.doi.org/10.1108/01443571211274576>.
- Croll, A., & Yoskovitz, B. (2013). *Lean analytics: use data to build a better startup faster*. USA: O'Reilly.
- Cross, N. (2006). *Designerly ways of knowing*. Cham: Springer. <http://dx.doi.org/10.1007/1-84628-301-9>.
- Dorst, K., & Cross, N. (2001). Creativity in the design process: co-evolution of problem–solution. *Design Studies*, 22(5), 425-437. [http://dx.doi.org/10.1016/S0142-694X\(01\)00009-6](http://dx.doi.org/10.1016/S0142-694X(01)00009-6).
- Edison, H. (2015). A conceptual framework of lean startup enabled internal corporate venture. In P. Abrahamsson, L. Corral, M. Oivo & B. Russo (Eds.), *Product-focused software process improvement* (Lecture Notes in Computer Science Book, Vol. 9459, pp. 607-613). Cham: Springer. http://dx.doi.org/10.1007/978-3-319-26844-6_46.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550. <http://dx.doi.org/10.5465/amr.1989.4308385>.
- Eisenmann, T., Ries, E., & Dillard, S. (2011). Hypothesis-driven entrepreneurship: the lean startup. *Harvard Business Review*. Retrieved in 2017, February 9, from <https://hbr.org/product/hypothesis-driven-entrepreneurship-the-lean-startup/812095-PDF-ENG>
- Endeavor. (2017). *Educação empreendedora: kit para liderar transformações na sua instituição de ensino*. Retrieved in 2017, December 6, from <https://endeavor.org.br/kit-de-educacao-empreendedora-para-2017-4-materiais-de-apoio-para-liderar-transformacoes-na-sua-universidade/>
- Farina, D. A. R. S. (2017). *Estabelecimento de startups: proposta de framework cíclico para geração e refinamento de conceitos e estruturação de operação inicial de negócios inovadores* (Dissertação de mestrado). Programa de Pós-graduação em Engenharia de Produção, Universidade de São Paulo, São Paulo.
- Fleury, A. L., Stabile, H., & Carvalho, M. M. (2016). An overview of the literature on design thinking: trends and contributions. *International Journal of Engineering Education*, 32(4), 1704-1718.
- Grotti, M. V. D. F., Fleury, A. L., & Zancul, E. S. (2016). A busca da eficiência por meio da aplicação do design thinking na integração de processos voltados à melhoria do produto na indústria. In *Anais do ENEGEP XXXVI - Encontro Nacional de Engenharia de Produção*. Rio de Janeiro: ABEPRO.
- IDEO. (2012). *Design thinking for educators* (2nd ed.). Califórnia: IDEO.
- International Council of Societies of Industrial Design – ICSID. (2017). *About*. Retrieved in 2017, June 10, from <http://icsid.org>
- Järvi, A., Taajamaa, V., & Hyrnsalmi, S. (2015). *Lean software startup - an experience report from an entrepreneurial software business course* (pp. 230-244). Cham: Springer International Publishing Switzerland.
- Karlsson, J., & Nordström, J. (2012). *Implementing lean startup methodology in large firms - Benefits, challenges and solutions*. Sweden: Department of Technology Management and Economics, Division of Innovation Engineering and Management, Chalmers University of Technology. Retrieved in 2017, December 6, from <http://publications.lib.chalmers.se/records/fulltext/156964.pdf>
- Lawson, B., & Dorst, K. (2013). *Design expertise*. London: Routledge. <http://dx.doi.org/10.4324/9781315072043>.
- Martikainen, A., Niemi, P., & Pekkanen, P. (2013). Developing a service offering for a logistical service provider - case of local food supply chain. *International Journal of Production Economics*, 157, 318-326.
- McCutcheon, D. M., & Meredith, J. R. (1993). Conducting case study research in operations management. *Journal of Operations Management*, 11(3), 239-256. [http://dx.doi.org/10.1016/0272-6963\(93\)90002-7](http://dx.doi.org/10.1016/0272-6963(93)90002-7).
- Morin, E. (2000). *Os sete saberes necessários à educação do futuro*. São Paulo: Editora Cortez.

- Neck, H. M., & Greene, P. G. (2011). Entrepreneurship education: known worlds and new frontiers. *Journal of Small Business Management*, 49(1), 55-70. <http://dx.doi.org/10.1111/j.1540-627X.2010.00314.x>.
- Neck, H. M., Greene, P. G., & Brush, C. (2014). *Teaching entrepreneurship – a practice-based approach*. London: Edward Elgar.
- Nirwan, M. D., & Dhewanto, W. (2015). Barriers in implementing the lean startup methodology in Indonesia - case study of B2B startup. In *Proceedings of the VI Indonesia International Conference on Innovation, Entrepreneurship and Small Business* (pp. 23-30). Indonesia: CrossMark.
- Oosterbeek, H., Van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review*, 54(3), 442-454. <http://dx.doi.org/10.1016/j.eurocorev.2009.08.002>.
- Osterwalder, A., & Pigneur, Y. (2011). *Business model generation: inovação em modelos de negócios*. Rio de Janeiro: Alta Books. Retrieved in 2017, December 6, from <https://timreview.ca/article/941>
- Piperopoulos, P., & Dimov, D. (2015). Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions. *Journal of Small Business Management*, 53(4), 970-985. <http://dx.doi.org/10.1111/jsbm.12116>.
- Rasmussen, E. S., & Tanev, S. (2015). The emergence of the lean global startup as a new type of firm. *Technology Innovation Management Review*, 5(11), 12-19.
- Rauch, A., & Hulsink, W. (2015). Putting entrepreneurship education where the intention to act lies: an investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning & Education*, 14(2), 187-204. <http://dx.doi.org/10.5465/amle.2012.0293>.
- Ries, E. (2011). *The lean startup*. USA: Crown Business.
- Robinson, P. B., & Sexton, E. A. (1994). The effect of education and experience on self-employment success. *Journal of Business Venturing*, 9(2), 141-156. [http://dx.doi.org/10.1016/0883-9026\(94\)90006-X](http://dx.doi.org/10.1016/0883-9026(94)90006-X).
- Sánchez, J. C. (2013). The impact of an entrepreneurship education program on entrepreneurial competencies and intention. *Journal of Small Business Management*, 51(3), 447-465. <http://dx.doi.org/10.1111/jsbm.12025>.
- Serviço Brasileiro de Apoio às Micro e Pequenas Empresas – SEBRAE. (2013). *Como elaborar um plano de negócio*. Retrieved in 2017, December 6, from <https://www.mt.sebrae.com.br/conteudo-digital/download/Conteudo/13>
- Souitaris, V., Zerbini, S., & Al-Laham, A. (2007). Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources. *Journal of Business Venturing*, 22(4), 566-591. <http://dx.doi.org/10.1016/j.jbusvent.2006.05.002>.
- Startup Genome. (2017). *Global startup ecosystem report 2017*. Retrieved in 2017, June 20, from <https://startupgenome.com/report2017/>
- Thiel, P. (2014). *Zero to one: notes on startups, or how to build the future*. USA: Crown Business.
- Trimi, S., & Berbegal-Mirabent, J. (2012). Business model innovation in entrepreneurship. *International Enterprise Management Journal*, 8(4), 449-465. <http://dx.doi.org/10.1007/s11365-012-0234-3>.
- University of São Paulo Innovation Agency – AUSPIN. (2017). *Agency history*. Retrieved in 2017, July 7, from <http://inovacao.usp.br/sobre-a-agencia/historico>
- Vesper, K. H., & Gartner, W. B. (1997). Measuring progress in entrepreneurship education. *Journal of Business Venturing*, 12(5), 403-421. [http://dx.doi.org/10.1016/S0883-9026\(97\)00009-8](http://dx.doi.org/10.1016/S0883-9026(97)00009-8).