Design of *Design*: Learning dynamics in Design Degree

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Abstract. Although different College's curriculums in Design point to different objectives/directions, there may be low awareness about different stakeholder's real needs in issues like design relevance, planning, production, marketing, selling and recycling of designed products. The curricular programs include the approximation of the Design students (DS) to the job market with the purpose of professional success. However, the labor-market-approach focus must also include the challenge of entrepreneurship, based on the transformation of DS projects into competitive products. Having in mind the relevance of the analysis of DS entrepreneurship predisposition to start-up of, and the need to stimulate this target to transform the DS skills allowing them to develop their business, this paper intends to: 1) profile the DS regarding their entrepreneurial competencies and capabilities, in a Design Degree context, and b) to know how to tailor Design curriculum in order to develop/align new DS skills for development/implementation of business projects.

Keywords: Design students (DS) · Design and Business · Entrepreneurship for Designers ·Design curriculum fitness

1 Introduction

Entrepreneurship is a multifaceted phenomenon that is affected by a variety of social, cultural, environmental, demographic and economic factors [1]. Entrepreneurship is a way of thinking, which highlights opportunities over threats, and the opportunity identification process is undoubtedly an intentional process, which offers a means to better explain, and predict, entrepreneurship [2]. In turn, the European Commission [3] defends that "Entrepreneurship refers to an individual's ability to turn ideas into action. It includes creativity, innovation and risk taking, as well as the ability to plan and manage projects in order to achieve objectives".

Since the early nineties, it was possible to assist to a growing effort on research using entrepreneurial intention models as a framework, thereby settling the applicability

of the concept in this field [4]. Entrepreneurship intention literature examines a range of issues that examines factors influencing entrepreneurship intention such as demographic profile (gender, age, education), contextual factors (such as perceived support, perceived barriers) and personality traits (extraversion, conscientiousness) [5].

To Thompson [6], intention is the self-acknowledged conviction by a person that intend to set up a new business venture and consciously plan to do it at some point in the future. To Lans et al. [7], it is possible to distinguish two dimensions of entrepreneurial intentions: the alternative entrepreneurial intention (i.e., the intention to continue operating an inherited or acquired firm) and the entrepreneurial intention (i.e., the intention to be an entrepreneur or corporate entrepreneur). At the same time, the universities and other education institutions started to get aware of the relevance of teaching and learning entrepreneurship as it became evident that the Entrepreneurship Education (EE) could influence the predisposition to start-up, or at least could influence individuals to become more proactive and entrepreneurial in their lives and their jobs. This concern is transversal to all students and graduates' levels.

There is a considerable number of Design students (DS) in EU universities for whom it will be difficult to start thinking about creating their own job [8]. This particular target group should be provided with "entrepreneurship experiential elements", thus an adequate entrepreneurship training program should cover the whole life-cycle of business and should be directly linked with the Design curriculum of Design M.Sc. or PhD students to whom the program is directed [9]. Given the importance of entrepreneurship to surpass the problem of unemployment of this target, more academic research is needed in order to provide useful insights in order to develop innovative entrepreneurship programs for Design students/graduates allowing them developing their transversal skills and providing them with a new professional path.

Training future Designers to act as managers has become a significant and frequently required component of Design education [10]. In part because multiples sectors of Business are placing a larger emphasis on recruiting creative but business skilled Designers because of the impact of innovation and creativity coming out from successful business initiatives on the economic and societal dimensions [11]. It is important that DS understand entrepreneurship context so that their designs can be significant, contextual and address real enterprises endeavors. Therefore, while training DS to develop Business knowledge and entrepreneurship skills, University pave the way to an important component of Design education in Design degrees. Moreover, it is critical that DS understand how this knowledge can have a significant impact in their professional lives, on the industry, or in the development of new products.

Having in mind the relevance of analysis of entrepreneurship predisposition of DS and graduates, and the need to stimulate this target to transform their own skills allowing them to develop their business, this paper intends to profile these students regarding their entrepreneurial competences and capacities. Accordingly, it is also expected to know how to tailor Design curriculum in order to create and align new DS skills for development/implementation of business projects. Thus, a set of data was collected during the diagnosis phase of the Project "*The Value of Transdisciplinar Projects: A Sustainable way in Academic Research*" (VTP.SAR). It is an exploratory study followed by a qualitative research approach which aims to build a sequential statistical procedure of factor, cluster and discriminant analysis allowed finding and profiling the groups of Design students and graduates concerning their awareness

about the requirement to identify, plan and manage all the needs, from the effective and efficient production point of view, in order to gain productive capacity and competitiveness in the market. With this approach it is intended to recognize the gaps in their formation concerning knowledge, skills and abilities towards entrepreneurship.

2 Literature review

A. Entrepreneurship Education

According to literature [12] entrepreneurship education is a structured and formal transmission of entrepreneurial competencies, which in other words, refers to the skills, concepts and mental awareness used by individuals during the process of starting and developing their growth-oriented ventures. The latter definition suggests that some outputs for entrepreneurship education that can be measured embrace changes in entrepreneurial values, changes in people's orientation towards entrepreneurial careers as well as changes in personal assessment of entrepreneurial knowledge and skills [13]. It is clear from the above definitions that entrepreneurship education is critical in todays' economy as it contributes to entrepreneurial knowledge and skills which leads to job creation and helps considerably to reduce poverty [14]. Entrepreneurship education leads to the improvement of the level of knowledge about how to launch and manage a new business venture. Besides, it enables students to gain experience in a real business context, foster favorable attitudes towards entrepreneurial activities [15]. It also develops perception of self-efficacy of students [16], raises the level of students' entrepreneurial purposes [17], and stimulates students to choose an entrepreneurial career [11]. In several universities and other Higher Education Institutions (HEI) in European Union (EU), Entrepreneurship Education (EE) is growing speedily given its potential to develop entrepreneurial skills and mindsets that benefit the society by stimulating creativity, innovation and self-employment [18]. Education and training opportunities play a crucial role in motivating future entrepreneurs and in developing the skills for the creation of new businesses.

Through an appropriate entrepreneurship education, an individual can acquire the skills and knowledge needed to launch and develop a new business. By these reasons some studies advance the idea that early formal entrepreneurship education affects the attitudes of students, influencing them in the direction of their future career and affecting their propensity for entrepreneurship on becoming adults [19]. Furthermore, Collins and Moore [20] suggest that entrepreneurial role might be culturally and experimentally acquired, and therefore influenced by education and training. Likewise, Gibb [21] states that the entrepreneurial predisposition is consistently being influenced by education and training. Cooney [22] states that entrepreneurship is a skill that can be learned, i.e., some basic skills in entrepreneurship can be developed through training and Drucker [23] argues that entrepreneurship is not "magic" and it has nothing to do with genes. It is a discipline, and like any discipline, it can be learned. Thus, very different skills, abilities and knowledge may be required to fulfil the different aims of entrepreneurship training programs.

B. Competences, Skils and other Traits Associates to Entrepreneurs

According to Mitchelmore and Rowley [24] competencies are not simply "the tasks for the job", but rather it is what enables people to do the task. The competences can

be described in terms of the crucial personal traits, skills, knowledge and motives of the employee that leads him/her to a better managerial performance. There are many competencies related with entrepreneurship, and most of them can be acquired and developed through learning [25]. Thus, Bird [26] suggests that entrepreneurial competencies can be defined as the underlying characteristics such as specific knowledge, motives, traits, self-images, social roles and skills that will result in a venture creation, survival and/or growth. In turn, Man et al. [27] define entrepreneurial competencies as the ability of the entrepreneur to perform a job role successfully. In their study, ten areas of entrepreneurial competencies, from a behavioral perspective were distinguished, namely: opportunity, relationship, analytical, innovative, operational, human, strategic, commitment, learning and personal strength competencies. Additionally, Robles and Zárraga-Rodríguez [28] evidence various competencies that are considered relevant to achieving entrepreneurship effectiveness: risk assumption, autonomy/self-determination, search and analysis of information, quality of work, communication, self-confidence, develop social networks/generation of support networks, dynamism, change management, initiative, innovation, integrity, leadership, self-control, results orientation, entrepreneurship competencies, social mobility, negotiation, troubleshooting, responsibility and teamwork.

In sum the key entrepreneurial competencies can be associated to the identification and definition of a viable market niche, development of new products and services, market niche/product innovation, idea generation, environmental scanning, recognizing and envisioning opportunities, and formulating strategies for taking advantage of those opportunities [24].

A skill is a translation of one's expertise/knowledge into a behavior. In adapting the skill concept to entrepreneurial behavior, entrepreneurial skills represent a capacity to organize and develop a business [29]. Elmuti et al. [30] show the skills that are required by entrepreneurs; these will fall into three distinct categories: technical skills, business management skills, and personal entrepreneurial skills. Technical skills include written and oral communication, technical management and organizing skills. Business management skills are managerial skills like planning, decision-making marketing and accounting. Entrepreneurs also should have personal skills such as innovation, risk taking, and persistence [31]. Furthermore, the skill-sets required to be an entrepreneur can be broken down into three groups: entrepreneurship skills, technical skills and management skills [22]. According to Chell [32] skills are multidimensional constructs; they comprise the cognitive – knowledge and what is learnt; the affective – emotional expression and what is experienced felt; the behavior – action at strategic, tactical and personal levels; and the context – sectoral, occupational, job and tasks levels, including the breadth, the demands and the inherent responsibilities. Correspondingly, skill should be distinguished from ability (an aptitude) and competency which appears to refer to a mix of knowledge, skills, abilities and sometimes other attributes as well; they comprise a cognitive (know-how), affective (the emotional expression of carrying out the task) and a behavioral (the selected action be it strategic, tactical or personal) element [32].

D. Designing Business and the Business Model Canvas

To motivate designers to be more entrepreneurial when taking a product from concept to market, it will require giving the designers crucial and extra insights about the total product development process.

For a newly formed designer, which is in a process of designing their business model and become Entrepreneur, several conditions that are still unknown need to be met. The newly formed designer should require business and management skills to make an approach that allows him to understand if and how a value proposition can be successfully scaled up to a profitable business. Designing a business model could prove to be challenging for a newly formed designer, as [11] confirms.

The Business Model Canvas (BMC) [33] is a strategic management template for capturing or developing business models for an organization. The single biggest impact the BMC has is helping management teams and strategists to create a more future-oriented strategy and it fits perfectly in the case of newly formed designer, which is in a process of becoming an entrepreneur. BMC is a visual compact presentation of nine building blocks that the authors consider underpin the description of a business model of an organization. The authors presented nine business building blocks with questions that promote an awareness and an understanding of what the building blocks in a BMC requires (Table 1).

Table 1. Business model canvas (BMC) [33].

Key partners	**Key activities**	**Value propositions**	**Customer relationships**	**Customer Segments**
Who are out key partners? Who are out key suppliers? Which key resources are we acquiring from our partners? Which key activities do partners perform?	What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams? **Key resources** What key resources do our value Propositions require? Our distribution channels? Customer relationships? Revenue streams?	What value do we deliver to the customer? Which one of our customers' problems are we heling to solve? What bundles of products and services are we offering to each segment? Which customer needs are we satisfying? What is the minimum viable product?	How do we get, keep and grow customers? Which customer relationships have we established? How are they integrated with the rest of our business model? How costly are they? **Channels** Through which channels do our Customer segments want to be reached? How do other companies reach them now? Which ones work best? Which ones are most cost efficient? How are we integrating them with customer routines?	For whom are we creating value? Who are our most important customers? What are the customer archetypes?

Cost structure	**Revenue steams**
What are the most important costs inherent to our business model? Which key resources are most expensive? Which activities are most expensive?	For what value are our customers really willing to pay? For what do they currently pay? What is the revenue model? What are the pricing tactics?

The BMC is very suitable for newly formed designer because is typically used when a lean startup methodology is applied [34]. A lean startup methodology is a

methodology that allows shorter product development cycles and articulates with design businesses because the design process and the lean startup methodology are processes that promote innovation [35]. The BMC reflects systematically on a business model but allows the newly formed designer to map each of its building blocks to real business scenarios with no specific condition to define all building blocks [36].

For an entrepreneur and future business owner in the Design area, to implement strategy, he/she would probably first need awareness of the business building blocks as well as how these building blocks relate to the resources and the business environment. Thus, the BMC, in an early-stage work, provides a how-to visual tool for designers to think about and plan their startup or their business with industry.

C. Entrepreneurship in Future Designers: Learning Dynamics in Design Degree

Design and creativity are becoming greatly sought out skills in several industries around the world. From big businesses to small corporations, design and Designers engage with strategic and company shaping discussions. Design as an economic driver is now abundantly clear with companies such those presented in Table 2.

Table 2. Design contribution at tactical and operational level

	Goals	Helping	Result	Example
Use design at the **tactical** level	• Achieve goals of certain business activities	• Help plan and design for business activities	• New product lines, new business plans	• Dell • Calvin Klein • Electrolux • IKEA • Nike
Use design at the **operational** level	• Achieve goals of individual products/ services	• Help plan and design for new business offerings	• New products, services	• Levi Strauss • Miele • Corticeira Amorim • Apple

Only the very best designs now stand out from the crowd, given the rapid rise in consumer expectations driven by the likes in social networks, instant access to global information and reviews; and the blurring of lines between the fashionable, usable, trending, stylish products. While eco-friendly products, from sectors so different as fashion, furniture or automotive industry, has never had particularly glamorous connotations, the best designers of a new generation are stitching sustainability into everything they do. While sustainability has long been considered a byword for hemp-heavy bohemia, a new generation of designers' entrepreneurs is building brands with a more conscious approach to fashion at their core. Whether they are sourcing fabrics through collectives empowering female workers (Richard Malone)[1] or transforming vintage scarves into resolutely contemporary dresses (Marine Serre)[2], theirs is an

[1] https://www.vogue.com/fashion-shows/fall-2019-ready-to-wear/richard-malone

[2] https://i-d.vice.com/en_uk/article/qvmmam/marine-serre-ethical-sustainable-fashion

approach to sustainability which eschews all those traditional connotations. Moreover, those environmental and social concerns make a bridge between a new Industry and enlightened consumers.

According to literature [6], it is no longer enough to come out of the university with a purely technical education. Designers need to be entrepreneurial in order to understand and contribute in the context of market and business pressures. For Designers who intend to start their own businesses soon after graduation, entrepreneurship education gives them solid experience in product design and development, technology trends, and market analysis [26]. These skills are just as significant for success in established enterprises as they are in start-ups; students with entrepreneurial training who join established firms are better prepared to become effective team members, designers and innovators. Therefore, instilling an entrepreneurial mind set in design students is essential if we want them to innovate and produce those innovations to better people's lives.

In Design, the future professionals should be capable of merging the potential of innovation, competitiveness and commerce to leverage the value of both the design objects and related services either inside or outside the closest scope of Design. This is a gap to overcome in the design curricula of higher education courses by carefully studying the essential requirements. In this article, we propose and explain the dimensions to consider in the integration of new dynamics in Design curriculum considering the integration of young and future designers into a realistic business context. This study also discusses the value of enhancing entrepreneurship and business knowledge management in Design post graduations.

3 Research Methodology and data collection

The data collected to this study came from the initial diagnosis phase of the Project "*The Value of Transdisciplinar Projects: A Sustainable way in Academic Research*" (VTP.SAR). This study constitutes an exploratory study and qualitative research approach. Taking in account the difficulties faced by postgraduate DS concerning the design, development and implementation of projects, and startups, it was applied online a questionnaire to a purposive sample of 60 participants, selected with the following criteria in mind:

- Students in Design areas
- Graduated in Design areas

With this questionnaire, the main goal was to seek information about (i) the sense of discomfort regarding starting work in a self-business startup, due to lack of skills, and (ii) the special requirements for skills in unfamiliar areas such as production, management, marketing and product stewardship.

The questionnaire was limited to 4 groups of differentiated but interconnected questions, as follows: (i) sociodemographic characterization of the sample; ii) identification of the Academic formation; (iii) perception of the skills acquired during the academic formation for the development of the professional activity; and (iv) perception of the importance of the need for other areas (Business, Entrepreneurship, Management, Marketing) in the academic formation for the success of their professional activity. The questionnaire was structured using closed questions, which included

questions adapted from the Likert scale with five levels of response, and dichotomous questions. In this way, respondents would comment on the proposals presented, and classify them accordingly, with (1) being not at all relevant and (4) being very relevant. The option of I do not know/I cannot answer was also included.

4 Findings

i) Profile of respondents

The sample consisted mostly of women (70%), and all the answers were considered valid. Regarding the age group, 44% of respondents were between the ages of 18 and 22, 30% were between 23 and 32 years, and 26% were over 33 years. In relation to the professional/student status, 57% are students, 16% are working students, and 27% are working professional and 10% out of these 27%, are professors. Concerning academic training, 46% of the sample are design students, 34% has already concluded the design graduation, 30% are MSc students, and 20% had a PhD in design.

ii) Perception of the fitness of academic graduation in Design to the working world

Although in this exploratory survey, the data were quantitative, the analysis was qualitative because statistical significance was not addressed. Therefore, the average values registered is be interpreted in a qualitative way.

Understanding the respondent's perceptions of the appropriateness of their training in design to the working world is an important driver for future improvement of Design courses. Circa 66% considers the quality and relevance of education and training good, 26% considers reasonable. Less than 4% do not express opinion.

In what concerns the perceptions of skills development during the training of Design, either in degree or post-graduation studies, the results reveal that less of 7% do not consider having adequate skills to accomplish a project of design development, while the large majority has a very positive perception.

The learning of subjects related to materials and technologies and their relationship with the design profession was approached in the questionnaire. The feedback obtained reveals that 70% of the sample is very pleased with the knowledge acquired. However, if the subject addressed in the questionnaire tackles entrepreneurship and the business and management area associated, the competencies perceptions are lower

The results reveal that only 16% considers having very good skills, while 33% refers to have fair knowledge and skills about the management of design processes applied to business, 10% considers do not having those skills and almost 7% do not respond. If the questions tackle the acquired competencies for the creation of a business plan, the results reveal the perception of a lack of appropriate qualifications or skills. Accordingly, 30% perceive to have a weak knowledge in this issue, 30% consider having a fair knowledge, and only 34% have a good perception of the previously referred skills.

The information collected helped us in the identification of the gaps, strengths and weaknesses in the current Design curriculum. This analysis also allowed us to identify specific entrepreneurial training needs.

The results pointed to some consensus regarding the lack of the following subjects that should exist in an entrepreneurship program directed to DS: entrepreneurial culture, communication and negotiation techniques, finances, basic management tools,

logistics for manufacture/delivery of product, setting prices, selling products, business models, marketing and market research, and soft skills in general. This is in line with [39] findings, who concluded that the most taught subjects on course contents in a typical entrepreneurship program were related with finances and business plan and those are the ones that skip in the DS curriculum.

5 Discussion and final remarks

Day after day the Design is turning more complex, pursuing in parallel the entrepreneurial world. Thus, the design professionals must know how to manage with lower margin for errors. It is in this world that the newly formed designers are integrated, and the acquired skills should be fitted to it. In this context, the value of a discipline resides in its ability to facilitate better-informed decisions. The perceptions of the DS, graduated, and post-graduated revealed in the questionnaire responses of the present research stresses the need to add skills to Designer's formation that could allow them to create business and new opportunities.

To further elaborate on the students' perceptions and attitudes, the results show that DS are positive about the integration of entrepreneurship in Design studies as it affords them the opportunity to develop their entrepreneurial skills. The findings of this study are largely consistent with earlier work [11] which indicate that using product design projects was extremely motivating to the students in part because they had the opportunity to develop their design and business plan and be able to accomplish it successfully. In this case the effect might have been augmented because the students had hands-on experience and teamwork [20]. Like other findings [12] the students had an overwhelming positive attitude towards the product design project tending to gain more in-depth understanding of design and make process as is generally observed for many market-driven design projects.

Finally, our study indicate that entrepreneurial education could equip DS with the knowledge and skills that appears to stir up their interest, intention and motivation towards entrepreneurship. The findings of this study support the view that employing a more action-based approach to entrepreneurial learning in Design studies is more likely to produce positive results as compared to traditional methods of learning [21]. Action-based pedagogies potentially allow for learning from highly emotional critical incidents in the venture creation process, if action is paired with reflection activities [25] call for expanding concepts of teaching entrepreneurship from a process-based approach with known inputs and outputs to a methods-based approach that supports iteration and creativity. The findings of this study support the thinking about the incorporation of entrepreneurship in design modules in which the problem solving takes place in the context of a business opportunity. Moreover, the Business Model Canvas, as a strategic management and entrepreneurial tool matched to help DS understand a business model in a straightforward, structured way. Using this canvas will allow DS to describe, design, challenge, invent, and pivot their business.

The awareness that creative professional designers and professional service firms have a significant business relevance, playing a key role for the competitive growth of both mature and emerging markets, emerges from the European Competitiveness Report [37]. This awareness led us to one of the pillar frameworks presented in the

Europe 2020 strategy: the one of Education and training. Thus, quality higher education and training is crucial for economies that want to move up the value chain beyond simple production processes and products [38]. Today's globalizing economy requires countries to nurture pools of well-educated workers who can adapt rapidly to their changing environment and the production system's evolving needs [39].

The aim of university education is to train a person for a job or to create perfect human beings and to build knowledge-based society or to prepare individuals to various situations that life offers. At its best, a university should broaden students' minds and horizons, allowing then to discern connections and analyze problems successfully, thus empowering them to change the world.

The future Design professionals should be skilled and furthered the Design education by merging the potential of innovation, competitiveness and commerce to leverage the value either of the design objects and related services, inside or outside the closest scope of Design. This gap needs to be overcome in the design curricula of higher education courses by carefully studying the essential requirements.

References

1 Dana, L.P.: The education and training of entrepreneurs in Asia. Education+ Training: Vol. 43(8/9): 405-416, (2001).

2 Krueger, M, Reilly, M., Carsrud, A.: Competing models of entrepreneurial intentions, Journal of Business Venturing: Vol. 15: 411–432, (2000).

3 European Commission, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Fostering entrepreneurial mindsets through education and learning, (2006).

4 Liñán, F., Fayolle, A.: A systematic literature review on entrepreneurial intentions: citation, thematic analyses, and research agenda, International Entrepreneurship Management Journal: Vol. 11: 907-933, (2015).

5 Zain, Z. M., Akram, A. M., Ghani, E. K.: Entrepreneurship Intention Among Malaysian Business Students: Canadian Social Science, Vol. 6(3): 34-44, (2010).

6 Thompson, E. R.: Individual entrepreneurial intent: construct clarification and development of an internally reliable metric: Entrepreneurship Theory and Practice: Vol. 33(3): 669-694, (2009).

7 Lans, T, Gulikers, . J., Batterink, B.: Moving beyond traditional measures of entrepreneurial intentions in a study among life-sciences' students in the Netherlands. Research in Post-Compulsory Education: Vol. 15(3): 259–274, (2010).

8 Paço, A., Ferreira, J., Raposo, M.: Development of Entrepreneurship Education Programmes for HEI Students: The Lean Start-up Approach. Journal of Entrepreneurship Education: Vol. 19(2: 39-52, (2006).

9 Thursby, J., Fuller, A. W., Thursby, M.: US faculty patenting: Inside and outside the university. Research Policy. Vol. 38 (1): 14-25, (2009).

10 Hitchings, M.G.: Career Opportunities: Connecting Design Students with Industry. Proc. - Social and Behavioural Sciences: Vol 228: 622 – 627, (2016).

11 Almeida I.D., Delgado M.J., da Silva J.M.V-B., Montagna G., Monteiro J.P:. Design and Business: Growing Up as a Separate Couple. In: Chung W., Shin C. (eds) Advances in Interdisciplinary Practice in Industrial Design. AHFE 2018. Advances in Intelligent Systems and Computing, vol 790. Springer, Cham, (2018).

12 Alberti, F., Salvatore Sciascia, S., Poli. S.: Entrepreneurship education: notes on an ongoing debate" In Proceedings of the 14th Annual IntEnt Conference, University of Napoli Federico II, Italy, vol. 4, no. 7. (2004).
13 Odora, R.J.: Integrating Product Design and Entrepreneurship Education: a stimulant for enterprising Design and Engineering students in South Africa. Procedia Technology: Vol. 20: 276 – 283 (2015).
14 Alvarez, S. A., Barney, J. B.: Entrepreneurial opportunities and poverty alleviation. Entrepreneurship Theory and Practice: Vol. 38(1):159-184. (2004)
15 Garo, E., Kume, V., Basho, S.: Programming" an Entrepreneur. Academic Journal of Interdisciplinary Studies: 4(1 S1), (2015.
16 Piperopoulos, P., Dimov, D.: Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self-Efficacy, and Entrepreneurial Intentions: Journal of Small Business Management. 53(4), 970 - 985 (2014).
17 Bae, T. J., Qian, S., Miao, C., Fiet, J. O.: The Relationship between Entrepreneurship Education and Entrepreneurial Intentions: A Meta Analytic Review. Entrepreneurship Theory and Practice: Vol. 38(2): 217-254 (2014).
18 European Commission, Entrepreneurship in Higher Education, especially within Non-Business Studies. Brussels: Final Report of the Expert Group, 2008.
19 Dinis, A., Paço, A., Ferreira, J., Raposo, M., Rodrigues, R. G.: Psychological characteristics and entrepreneurial intentions among secondary students, Education + Training: Vol. 55(8/9: 763-780, (2013).
20 Collins, O. F., Moore, D. G.: The Enterprising Man, Michigan State University Press, East Lansing, MI, (1964).
21 Gibb, A.A.: Enterprise culture: Its meaning and implications for education and training, Journal of European Industrial Training: Vol. 11(2): 3-38, (1987).
22 Cooney, T.: Entrepreneurship Skills for Growth-Orientated Businesses, Workshop on 'Skills Development for SMEs and Entrepreneurship', Copenhagen, (2012).
23 Drucker, P.: Innovation and entrepreneurship. New York: Harper & Row Publishers, (1985).
24 Mitchelmore, S., Rowley, J.: Entrepreneurial competencies: a literature review and development agenda, International Journal of Entrepreneurial Behaviour & Research: Vol. 16(2): 92-111, (2010).
25 Tan, S., Ng, C.f.: A problem-based learning approach to entrepreneurship education. Education + Training: Vol. 48(6): 416-428, (2006).
26 Bird, B.: Towards a theory of entrepreneurial competency, Advances in Entrepreneurship, Firm Emergence and Growth: Vol. 2: 51-72, (1995).
27 Man, T. W. Y., Lau, T., Chan, D.F.: The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. Journal of Business Venturing: Vol. 17(2): 123-142, (2002).
28 Robles, L., Zárraga-Rodrígueza, M.: Key Competencies for Entrepreneurship, 2nd Global Conference on Business, Economics, Management and Tourism, Prague, Czech Republic, (2014).
29 Kutzhanova, N., Lyons, T. S., Lichtenstein, G. A.: Skill-Based Development of Entrepreneurs and the Role of Personal and Peer Group Coaching in Enterprise Development, Economic Development Quarterly: Vol. 23(3): 193-210, (2009).
30 Elmuti, D., Khoury, G., Omran, O.: Does Entrepreneurship Education Have a Role in Developing Entrepreneurial Skills and Ventures' Effectiveness? Journal of Entrepreneurial Education: Vol.15: 83-98, (2012).
31 Henry, C., Hill, F., Leitch, C.: Entrepreneurship education and training: Can entrepreneurship be taught? Part I. Education & Training: Vol. 47(2/3): 98-112, (2005).
32 Chell,E.: Review of skill and the entrepreneurial process. International Journal of Entrepreneurial Behaviour & Research: Vol. 19(1): 6-31, (2013).

33 Osterwalder, A., Pigneur, Y., Clark, T.: Business model generation: a handbook for visionaries, game changers, and challengers. Hoboken (NJ): Wiley (2010).
34 Zeithaml, C.P., Rice, G.H.: Entrepreneurship/Small business education in American universities. Journal of Small BusinessManagement: Vol 25(1): 44–50. (2005).
35 Müller, R. M., Thoring, K.: Design thinking vs. Lean startup: A comparison of two user-driven innovation strategies. Leading Through Design, Vol. 8: 151–161 (2012).
36 Günzel, F., Holm, A.B.: One size does not fit at all – understanding the frontend and back-end of business model innovation. International Journal of Innovation Management: Vol. 17(1): 1340005-1-1340005-34 (2013).
37 EU 2014: EU, European Competitiveness Report (2014).
38 Rittel, H. W., Webber, M.M.: Dilemmas in a general theory of planning, Policy Sciences: 4(2): 155--175 (1973).
39 Branagan, A.: The essential guide to business for artists and designers. London: Bloomsbury (2017).