CLab Torino: a transdisciplinary environment to provide a challenge-based teaching model

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Abstract

Promoting an open dialogue, a constant interdisciplinary collaboration with companies, between universities, about partnership or open innovation perspective, today is a challenge that still faces some resistance. Learning to deal with complexity, with the coexistence of different points of view, in collaboration to combined and re-combined know-how in ever new, original and challenging formulations, brings with its specific needs. In this sense, design takes on a fundamental role to create projects with a view to sustainable innovation, projects that are increasingly responsive to contemporary complexity. So, how does design education need to change? How do working designers and design researchers can update their skills to meet the challenges of the present and future?

This contribution, through the experimentation of the Contamination Lab Torino, investigates a new design-driven educational model intended as an extremely dynamic process from the creation of a multidisciplinary team to the transition from a product design logic to a Product Service System one, as the most effective way to face the issue of the system management, as a way to guarantee the appropriate flexibility to the contemporary needs of our society.

Keywords: Entrepreneuship education; educational model; transdisciplinary education; design; sustainability.

1. Introduction

Never as in the cultural contemporary scenario, the design field intrinsically understood, is facing continuous, fast and radical metamorphosis. Metamorphosis that are shifting the attention from a traditional focus on the product in favour of a design more oriented to service, process and communication. A design that necessarily, will have to get closer to the companies core business, with the final goal to enable design-lead entrepreneurship.

If though, until a few years ago, the design discipline remained almost independent and separate from company functions, now organizations have begun to invest and increasingly consider the opportunity to involve design skills as an innovative tool to grow and expand their strategies to face the most complex challenges. On a practical level, included in the Europe 2020 context in 2015, the European Commission with 'Design for Enterprises' realized a free formative programme to approach small and medium-sized enterprises to the world of innovation, showing how this can be the key to improving efficiency, competitiveness and sustainability. As J. Maeda highlighted in his report 'Design in Tech 2018', many companies started to introduce designers in their team. IBM, to name one, increased its designers' share from a ratio of 1 designer every 72 engineers to a ratio of one to eight. McKinsey published their 'The Business Value of Design' report 2018, authored by trusted management consultants, that created real design buzz in boardrooms (Beausoleil, 2018). In 2017, 21 creative agencies had been acquired by larger players: Acne has been acquired by Deloitte, Intrepid by Accenture, DeviantArt by Wix, to name a few (Maeda, 2018). The discipline of design, in this sense, plays a fundamental role, shifting its interest from simple product design to the entire process, from data analysis to implementation and final development. This inevitably leads to an increase in the complexity of the design; new avenues are always being opened, unexplored business models, ever new forms of innovation that could favour a greater ability to unleash entrepreneurial potential. Just think of the academic and research spin-offs, which could strategically find the right ecosystem both in terms of use and funding. So what do we expect from the entrepreneurship education of the future? From this scenario, the contribution aims to explore the design role within a training system focused on the developing entrepreneurial skills. A development of skills based on a multidisciplinary approach, the use of innovative teaching materials and original tools. A development of entrepreneurial skills guided through the lens of sustainability.

2. Towards a new design-driven educational model: the Contamination Lab Torino

According to Glen et al. (2014), design-thinking provide *'a very useful front end to the new approaches to entrepreneurship, in giving students much more useful guidance on how to carry out a productive and user-centred ideation process'* (Glen et al. 2014, p. 662). Starting

from the analysis of the national and international state of the art (Fiore et al., 2019a; 2019b), the discussion in this article is based on data derived from a real case study carried out in Italy: Contamination Lab Torino (CLabTo). This programme is characterized by bringing challenge-based activities, that are usually performed outside the university (such as hackathons), within the academic system, transforming them into structured training courses. Although other programmes have been carried out in the academic field, however they often refer to a single field of study, such as business and management education (DeTienne and Chandler 2004; Musteen et al. 2018), sciences and technology (Souitaris et al. 2007; Barba-Sánchez and Atienza-Sahuquillo 2018) or computer engineering (Arias et al. 2018). The programmes performed in design schools (Glen et al., 2014), so far do not involve multi-background students. Indeed, if it is quite common providing a multidisciplinary teaching, it is not as common involving students from different disciplines, due to constraints and the little exchange expected. The experience of Thursby et al., (2009) turned out to being multidisciplinary, but it does not involve students from humanities nor design. Contamination Lab (CLab) is a nationally-funded programme that, at the state of the art, counts 22 CLabs spread out throughout Italy. Each of these CLabs is recognised at a ministerial level. This entrepreneurship programme involves two universities – the Politecnico di Torino and the University of Turin – the former focuses on technical disciplines, the latter on science and humanities, thus providing the opportunity to involve students from every field of study. The CLabTo programme has the twofold aim of developing the students' entrepreneurial skills in running their businesses, as well as in working in interdisciplinary teams to address real-life challenges and complex situations by developing skills such as problem solving, team working, system thinking, and more. CLabTo is based on challenges of limited duration (from one week to a few months) directed towards innovation. The programme is divided into training and teamwork. The first part involves a discussion between students and professors from different research fields, and it is aimed at filling the theoretical-methodological and entrepreneurial gaps of the students with diverse curricula and from different backgrounds. Professors from different departments and research fields also increase the multidisciplinary aspect of delivering pedagogy (Fiore et al., 2019b). The second part mainly involves team-based work facilitated by tutors, which are professors, experts from industry and entrepreneurs. Challenges have the peculiarity of being complex, and the expected outcome should consist of a viable idea to address a problem or a new scenario. Mentors and tutors help students by giving feedback on their teamwork in planned time slots or during intermediate presentations and pitches. CLabTo engages students in tasks, activities and projects that should enable them to acquire key entrepreneurial skills and competences in a real-life situation (Nielsen & Stovang, 2015). For further information on the methodology of the ClabTo programme, please refer to the related section in the paper '*Entrepreneurship Education in a Multidisciplinary Environment: Evidence from an*

Entrepreneurship Programme Held in Turin' (Fiore et al., 2019a p.7-8). Below we will deal in detail with the characteristics of the CLabTo useful for the debate of this contribution.

2.1. Transdisciplinarity

Transdisciplinarity is not only the relation and the interaction of separate branches of knowledge but the integration of them as a whole (Peruccio et al. 2019). From this assumption, the CLabTo works to create an environment rich in cultural contamination, in the sense of mixing skills and competencies. From economic sciences to social sciences, from engineering to linguistics, ensuring transparent, informed and cooperative access to decision management. The high number of interlocutors multiplies, therefore, the interactions in terms of quantity but at the same time the openness towards the outside to heterogeneous realities characterized by diversity in terms of identity and skills, soliciting the decision-making action in qualitative terms, unifying the overall organizational system consistently. With these premises, the need to form transdisciplinary teams arises from the need to face increasingly complex real-life situations and highly multi-thematic challenges. For this reasons, we usually spend the first days of lessons to build these transdisciplinary teams, giving the students the task to form their team with at least three different skills included, that we can summarise in the following categories: Design/architecture, Engineering, Humanities, Management, Natural Science.

2.2. Teaching model

Entering more deeply in the structure of the case study proposed, about the teaching models, we can summarize as follow the main 'educational activity':

- first day: welcome and presentation of the brief by the managers the company involved;

- first week: we provide the students with short teachings (1-2 hours) on sustainability, entrepreneurship, design thinking, digital innovation, etc., that is, the general and mandatory modules of our programme, and also all the challenge-specific contents useful for the complete comprehension of the specific thematic.

- second week: to all students, we ask to work in teams to develop the idea with the support of tutors and mentors;

- last day: 10-minute pitch per team to present and explain the idea to an audience that includes CLab programme members, university faculty members, industry mentors and members of the university incubators (Fiore et al. 2019b).

2.3. Learning by-doing and expected outcomes

According to Rae & Carswell (2000), a learning-by-doing programme enhances the development of student's entrepreneurial skills. The balance between the theoretical part and the practical one is very important for this programme because it allows students to work on a real case study developing their own idea. Watts (2000) explained that individuals learn from experiences and failures. Students learned more about the specific topics from the tutors, mentors and professors from both industry and academia (Fiore et al., 2019a). It is important to highlight how all the projects emerged from the CLabTo do not consist of marketable products. In particular, they embrace a Product Service System (PSS) logic that often includes products, IT and services. These types of projects require longer engineering, which would often need the creation of an in-depth business model and a number of test on the final PSS in order to be able to screen and test the functioning of the system. For this reason, in most cases the projects are considered completed at a concept phase, accompanied by some studies that include a rough economic and technical feasibility. Only those students who decide to create their startup continue developing their entrepreneurial idea in other structures, such as incubators.

2.4. Focus on sustainability

About mobility, in the fight against food waste, in order to convey meaning in a more transparent way, at the energy level, CLab Torino investigates sustainability in its broadest and most complex meaning. The fil rouge of the entire programme is the attention to the user's needs and the possible future effects of the project with a specific point of view to sustainable innovation. A sustainability that finds a balance between the social, environmental and economic dimension. A sustainability whose prerogative and whose ultimate goal are precisely innovating for and with the territory, generating value for companies and therefore for the territory itself. A sustainability that qualifies the systemic use of resources daily as well as a collaborative and participatory approach. Finally, due to the growing attention on this topic, it will be our commitment to future challenges to encourage students to adhere with more and more emphasis of one of the circular economy strategies or one of the objectives of sustainable development goals.

3. Results

Based on the evidences emerged from the CLab To experimentation analysis, the role of design education, with ever greater emphasis, it will necessarily have to be defined and redefined as an extremely dynamic process, able to guarantee the appropriate flexibility to the emerging needs of a context that is, by nature, dominated by flexibility: the entrepreneurship. About CLab To results, three are the main macro-categories on which the investigation carried out so far moves: the observation about designer's facets, the

experiences about teaching and learning and new tools useful to support and drive the new educational model proposed.

3.1. The designer's facets

In order to properly cope the flexibility mentioned above, designers cannot anymore act alone: they become the interface in a multidisciplinary team in which the network of knowledge enables to embody in the process the contemporary complexity. We investigated different roles that today a designer could introduce within the corporate. The analysis can be summarized in 10 different skills (Yee & al., 2017).

Designer (D.) as a technology enabler, able to emphasize and improve the usability of a device by maximizing involvement and minimizing errors and frustrations. D. as a creativity enabler, to all intents and purposes a figure capable of bringing out the individual creative potential of each, in order to facilitate the work of the entire team [Kelley & Kelley, 2013]. D. as a community builder, for the ability to see with the eyes of another, put him/herself in the position of another — a way to enhance the human dimension of the entire process. D. as a power broker, to be able to shift attention from purely economic metrics to solutions focused on the context by creating an inclusive environment by encouraging plurality. D. as a transformation reader because innovation cannot exist without an attitude to change. D. as a data culture enabler, because data today is a precious medium from which to derive insight for more conscious design. D. as a knowledge broker, to help the entire team to define processes, establish the tools and methods to create a structure capable of providing a guide and a common language for all the actors involved. D. as a cultural catalyst or intended as the enabler of lateral thinking to definitively break the silos-centric vision. D. as a sustainability consultant, to promote a real breakdown of the traditional cliché linked to sustainability, guiding companies to a 360-degree investigation of this concept. Finally, D. as a system thinking promoter, to promote a culture of responsibility, a culture geared to change to generate progress. Promoting systemic thinking means creating new opportunities starting from the power and strength of the relationships that exist between all the actors and elements of a system (Bistagnigno, 2011).

3.2. Teaching and learning experiences

Due to the peculiarity of the educational experimentation, we decided to provide on one side a practical approach through learning-by-doing activity, on the other side to apply the concept of 'thinking outside the box' for any field of study involved. Achieving a pedagogical delivery that simultaneously engaged all the student was challenging. For this reason, we decided to set up a new lessons programme, using contamination between the offers of the two universities involved. First of all because, due to the extemporaneousness of the experience, we needed to cover particular and always different topics in specific days and at

specific times. Secondly, we needed to balance the differences in students' background and consequently find the right balance between generic and fundamental themes and the specific focus based on the challenge brief. In other words, the key for the class structure is delivery to inform those with limited backgrounds, while avoiding annoying those with in-depth knowledge (Thursby et al., 2009). As a result, from the first edition, the winning team got the second place during an internal competition of the Italian CLabs and those students obtained funding for a research grant from the company who sponsored the challenge. From the teams of the third edition, the winning team passed the first selection of the Start Cup regional prize, obtaining a prize of €5000 euros for a pre-incubation at the incubator of the Politecnico di Torino (I3p).

In order to assess the extent to which CLabTo classes and team experiences contribute to fostering the professional development of design students, they were asked, in both pre- and post-surveys, to provide a self-assessment of their capabilities and perceived expertise in each of six skills listed in Fig.1, which are derived from the GUESSS project[1] (Fiore et al., 2019a).
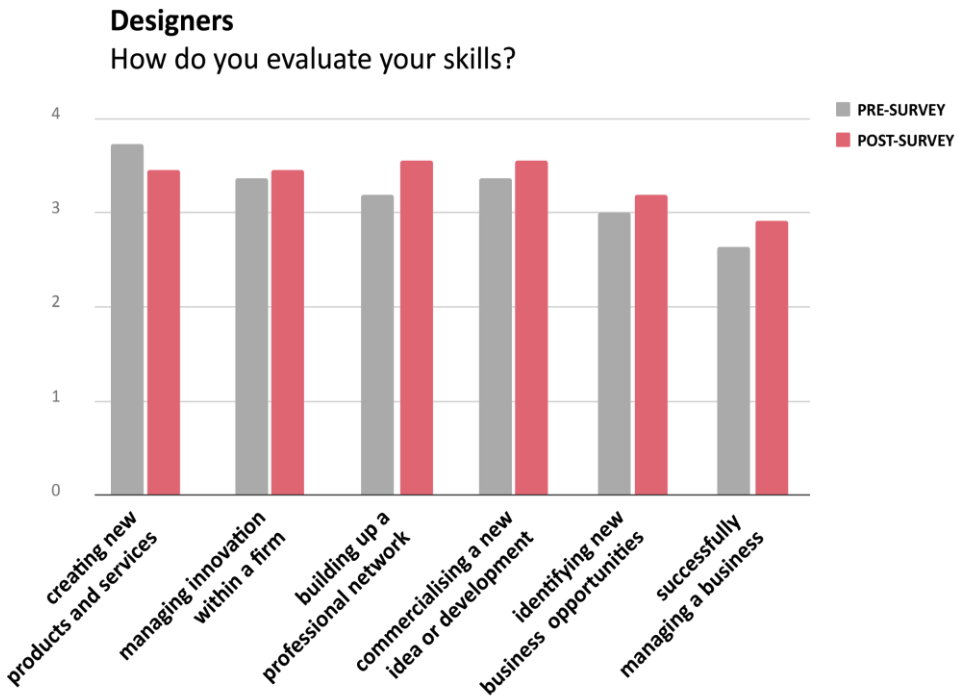

Fig 1. The perception of the design students' entrepreneurial skills in the pre- and post-course questionnaires.

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[1] GUESSS is a large, global research project on student entrepreneurship. More information is available on: http://www.guesssurvey.org/.

Comparing pre- and post-survey results, we could notice that the first two items related to innovation and development of new ideas/products/services have experienced smaller increase or even a decrease. We supposed designers had found it difficult to put their skills into practice in a complex challenge, thus they finished the programme a little less confident. On the other hand, students from other disciplines experienced an increase in the perception of these skills (Fiore et al., 2019a). The third skill "build up a professional network" experiences an increase, while the last three skills refer to the business aspects of commercialising new ideas, identify business opportunities and managing a business strategy. The perception of these skills has increased, testifying the importance of providing designers with an interdisciplinary entrepreneurial programme.

3.3. Innovative materials and new tools

Students were taught new tools to brainstorm and disseminate their ideas such as visual scribing and sketch-notes in order to provide all types of students some non-trivial communication tools, together with other practical tools on the business side. Visual scribing is a graphic narration of the interventions of a seminar or a conference so that the concepts are schematized and made accessible to the audience. We decided to borrow this expertise and apply it in a working table with the same purpose; in addition, the goal of rationalizing ideas that otherwise could get lost in the flow of the debate. This skill will help them to make a joint work session productive (from brainstorm to the business plan or other). In our opinion, this skill allows them to manage the interdisciplinary team and collect everyone's ideas and contributions. It gives a certain structure to the team working and brainstorming hours, allowing the team to achieve their goals. This type of activities can be considered soft skills. Moreover, CLabTo adopts teaching methods and space layouts for teaching and teamwork, which stimulate cooperation among the students who work in teams (Fiore et al., 2019b). We work is a single multipurpose room that can be shaped based on the activity to be performed. Other activities have been performed outside the classroom thanks to a network of industrial partners scattered throughout the area.

3.4. Experiences outside the classroom

Many and of a different nature are the activities that take place outside the classroom, for example: FabLab Torino hosted our students in order to develop their prototype with adequate support and tools. The development of the prototypes included both the hardware and the software. Besides, the students experienced working closely with an incubator, by working with I3p during the StartCup competition mentioned above. CLabTo is part of a national network called Italian CLab Network, and it organizes or helps to organize, or takes part in, shared events. In May some selected students participated in a joint event together with the other Italian CLabs organized by the Italian CLab Network, the 'Italian CLab Running'. This competition was based on two aspects, a team race of a mile and the

presentation of projects through a pitch. The teams were rewarded on the combination of race time and pitch quality. Eight universities with their own Contamination Labs attended the event also involving CLab staff in the one-mile race, and the team of CLabTo won the silver medal.

4. Remarks

This contribution highlights how much important is the collaboration between people with different know-how. However, the process to create the right balance between hard and soft skills, technical and humanistic point of view, theoretical and practical activities, can be complex, and it requires some experience. The importance to introduce practical approaches such as design thinking in multidisciplinary teams is, the key on one side to unlock the potential and the creativity inside each student, on the other side to determine a new model that we can define a design-driven entrepreneurship education. Nevertheless, as another strand of literature points out the need to introduce Entrepreneurship Education (EE) into the curricula of design schools to increase the ability of design candidates to turn product ideas (concepts) into actions and to develop managerial, economic and strategic thinking skills. EE is expected to allow designers to develop entrepreneurial skills and mindsets, in order to create new jobs in the future and to become major drivers of economic growth through creativity and innovation (Fiore et al., 2019b).

5. Conclusions

Enable a sustainable innovation through design is, but even more so in the future, a strategic opportunity that will involve every aspect of daily business life, becoming a skill increasingly close to the company's core business. The competences, or rather the facets that characterize the complexity of the designer figure, today include for example the ability to work and collaborate in heterogeneous teams, high empathy without sinning in technical expertise, commercial acumen or strategic thinking. For this reasons and through the real case study of the Contamination Lab Torino we can assume that design education needs to change, becoming an always more dynamic process, able to guarantee the appropriate flexibility and compliance to the emerging need of our society, a society intrinsically dominated by changing.

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