Design schools have an important role in promoting innovation and sustainability in society. Didactic and research activities can be oriented to approach societal problems and develop solutions for specific contexts. ‘Living laboratories’ (living labs) offer significant opportunities to investigate everyday practice and collaboratively explore possibilities, by opening a space of encounter between researchers and users. This paper presents the initiative Laboratory of Design, Co-creation, and Sustainability, aimed at investigating design strategies to promote the culture of sustainability among youth. It included young design students from both university and technical secondary education. Methods involved participatory design-based analysis, context-mapping, and strategy generation. The results emphasize: a. the need to develop competencies in sustainability within design education, promoting critical thinking and ability to implement innovative solutions; b. the potential of co-creation to generate ‘contexts for change’; c. the need for more open and flexible educational approaches, allowing common sharing, engagement, self-reflection, and flexible assessment.

design education, co-creation, living labs, design for sustainability

1 Introduction
Promoting the culture of sustainability among young people is a fundamental strategy to support the creation of contexts for change towards sustainable ways of living. The view on the central role of culture for development reinforces the need of allowing for full participation and empowerment of citizens and communities in the solutions for the future. It is especially concerning the new generations that the promotion of a transition towards healthier, sustainable and integrated lifestyles is fundamental. In this context, design principles and practices constitute a potential field for creative innovation and support for promising initiatives on sustainability, offering skills, abilities, methodologies and a unique viewpoint.
The aim of the present study is to investigate design strategies for enabling change and fostering the development of a culture of sustainability among design students. The focus is to develop and to apply participatory approaches, stimulating reflection, critical thinking and their ability to propose and implement innovative strategies for sustainability and social innovation.

This process aims to contribute to the training of design professionals able to act creatively and effectively, searching solutions to the complex contemporary issues through research, analysis and experimentation conducted and oriented by design approaches. First, we expose the theoretical framework and methodological procedures adopted. Following, we describe the initiative, some results and final considerations.

2 Theoretical Framework

2.1 Culture of Sustainability

Concerns about economic growth to the detriment of the environment have been prominent on the international agenda since the United Nations Conference on the Human Environment in 1972. In 1987, the United Nations produced the document Our Common Future, proposing the classic definition: "Sustainable development is one that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 48).

The dimensions of sustainability are often discussed based on the widespread Triple Bottom Line model (Elkington, 1994), which identifies the three pillars of sustainable development: ecological quality, economic prosperity and social justice.

The term ‘social sustainability’ often refers to a particular branch of sustainable development concerned with its social dimensions and implications (Vallance et al, 2011). McKenzie (2004, p.12) proposes a working definition: “social sustainability is a life-enhancing condition within communities and a process within communities that can achieve that condition”. The author lists a series of indicators, which go from equity of access to key services to transmission of awareness of social sustainability between generations (McKenzie, 2004). In a broad sense, social sustainability concerns the ability of human beings of every generation to not merely survive, but to thrive (Magis & Shinn, 2009).

The transition towards sustainability constitutes a process of social learning (Manzini, 2008), reflecting the centrality of a cultural shift in how individuals and society address issues in these dimensions (Duxbury & Gillette, 2001). Hence the importance of considering the cultural dimension of sustainable development (Soini & Birkeland, 2014), fundamental due to the necessary major societal changes in perception and values in the transition to sustainability. Universities are an important player in the constitution of this field of knowledge and practice in the local contexts. Higher education should involve students and scholars in advancing research and knowledge in order to build more integrated and efficient frameworks for social and cultural sustainability, but also to model sustainable awareness and practice.

2.2 Role of Design facing societal challenges

Design is a dynamic process: the act of thinking, planning and devising courses of action with a particular purpose. It is possible to say that a designer is a “thinker whose job it is to move from thought to action” (Friedman, 2000, p. 10). Design can be approached in its various dimensions, among which are highlighted: (a) as a conscious effort of the individual to establish a significant order for things and objects that surround him (McCarthy & Grenville, 1997); (b) as a process and a set of projects and creative activities; (c) as an active agent for problem solving, through the planning and implementation of actions to change existing situations into preferred ones (Simon, 1982); (d) as an agent to create and recreate the sense of objects and experiences (Franzato, 2010); (e) as an agent of mediation between diverse actors, transversal by nature, which acts by facilitating and supporting the development of innovations (Krucken, 2008).
In the context of the transition towards a sustainable culture and lifestyle, the field of design offers a range of potentialities and interfaces for innovative action. The authors point out that design can be a powerful catalyst in this subject, proving to be an effective methodology of intervention (Manzini, 2008). Designers can contribute in many directions: proposing plural solutions and designing new scenarios (Krucken, 2008); establishing conditions for the creative context (Landry, 2000); developing tools, equipment and infrastructure to support promising practices (Malaguti, 2009); using their knowledge and specific tools to facilitate convergence towards the shared ideas and potential solutions (Manzini, 2008). In some cases, its role expands, with the application of concepts and principles of design permeating all phases of the project or intervention.

In the words of Manzini (2008, p.16), “creativity and design skills are elements effectively needed to move a social and technological innovation process of such magnitude as required by the transition towards sustainability.” Characteristics of design can contribute to solve the issues of our time: interpretative wealth and visionary ability (Krucken, 2008), as well as skills of thinking in a systemic manner and the inventiveness of language (Cardoso, 2012).

The focus of design is evolving toward a systemic perspective, increasing its field of action. “The transition to a sustainable society will require new ways of designing that are informed by a vision, a deep understand of the dynamics of change and a new mindset and posture” (Irwin, 2015). At this point, it is important that designers develop skills to be facilitators in process of innovation, promoting collaboration and active participation: to integrate, to activate dialogues, to create connections (Krucken, 2008). Multidisciplinary action networks take form, in which designers can contribute offering their specific competence and professional knowledge, interacting with other non-professional designers in a partnership model (Krucken, 2008).

It is up to designers to participate actively and positively in the development of sustainable solutions in various fields (Manzini, 2008). In the words of Margolin (2007, p.14): “faced with the growing complexity, designers have to think more profoundly about the future and their role in making it into the present.” More specifically, design schools can play an important role in the emerging scenario, generating original ideas and interacting with local communities (Manzini, 2011).

In this study, we explore the possibilities of differentiated intervention to generate solutions to contemporary issues, applying Design principles and practices. In this context, co-design practices and collective creation of strategies and tools emerge as promising modes of action.

### 2.3 Participatory Design approaches and Living Labs

Participatory processes are described in academic literature with various terminologies and from the perspective of several fields of knowledge. Participative research, action orientation and transdisciplinary approaches became prominent within academia in the 1970s and particularly in Scandinavia, England, The Netherlands and Germany. Some of its origins are related to conflict resolution (Lewin, 1946), democratisation and (re-)development of society (Reason, 2002), as well as collaborative work supported by labour unions (Nielsen & Nielsen, 2006). Within the social sciences, the search for perspectives on participatory approaches have been coined "action research" (Lewin, 1946). Nielsen & Nielsen (2006) argue that besides the original idea proposed by Lewin (1946) on how to approach practice and theory of action research, the field is also oriented to the development of "democratic forms of knowledge" as well as "critic of authoritarian structures and culture".

Participatory approaches in design are guided by the general idea of involving all stakeholders in the design process to help ensure the result meets their needs. Some authors defend the idea that design could lead the way to a cross-disciplinary framework on participation (Harder, Burford & Hoover, 2013). The current context offers opportunities for changes in participatory practices, including a surprising opening for experimentation and a shifting notion of design. New forms of participation arise, including open and user-driven innovation, living labs, fabrication labs, public participation and social innovation, among others (Bannon & Ehn, 2013).
Living labs emerged as a response to close innovation environments and become a major platform for innovation in Europe (Bannon & Ehn, 2013). The initiative presented in this paper is positioned among design school labs, a specific kind of living labs involving teachers, researchers and students. In the search for a definition for Living Lab, we would like to highlight the contribution of Bergvall-Kåreborn et al. (2009). By means of an extensive investigation on definitions, approaches and experiences, the authors proposed this comprehensive statement:

A Living Lab is a user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values. (Bergvall-Kåreborn et al., 2009, s.n.)

In the field of design research, often Living labs are described as a design research method in the field. Dell’Era and Landoni (2014) define Living Labs as “a design research methodology aimed at co-creating innovation through the involvement of aware users in a real-life setting” (Dell’Era & Landoni, 2014, p. 139). Complementarily the authors situated it in the map of design research methodologies, proposed by Sanders (2006), as can be seen in Figure 1.

![fig1.jpg](Fig.1. Living Lab in the map of design research methodologies: Source: Dell’Era & Landoni (2014, p. 149), based on Sanders (2006).

According to this analysis, a Living Lab is part of the ‘research-led’ group of tools that promotes a participatory context. The authors highlight some characteristics of Living Labs as: real-life experimentation environment; involvement of aware users in the co-creation; use of diverse interaction strategies with users and stakeholders; use of platform technologies to exploiting the potentialities provided by existing technologies or create value, by exploring the opportunities provided by new technologies (Dell’Era & Landoni, 2014).
We consider Living Labs either as a user-centric innovation milieu built on every-day practice, and as a design research method, which has potential to promote social innovation and sustainable values in society.

2.4 Student development and engagement in sustainability

Applying design Living Lab in undergraduate courses has also the potential to improve students’ developmental outcomes and their engagement with sustainability. During the college years, students are navigating the complex transition from adolescence to adulthood. Emerging adulthood might be considered a key turning point in the life span (Schwartz, 2016), since the young person is undertaking a process of identity exploration; reflection and experimentation with values and principles; and search for meaning and purpose in professional and life choices. Empowerment is considered a fundamental factor for young people to guide themselves and constitute a future development plan, which has an impact not only at the personal level, but concerns the whole society (Mouchrek, 2017). Capacity Development for the Transition to Adulthood is one of the three axes of the Operational Strategy on Youth 2014-2021, proposed by the United Nations Educational, Scientific and Cultural Organization (Unesco, 2014). Learning experiences that include opportunities for reflection, experimentation, elaboration of possible futures and ethical choices are particularly suited to improve individual development trajectories, enrich and complement students’ academic and professional formation.

In order to face the youth’s contemporary and future challenges, it is essential to invest in creating new scenarios and lifestyles, strengthening critical thinking, autonomy, ability to make choices, stimulating new perspectives and practical ways (Mouchrek, 2015). Design-based participatory process are suited to support youth development and empowerment at the extent that they: (a) provide spaces for experimentation, inviting youth to reflect and enact choices in a non-serious, playful environment; (b) offer opportunities for peer interaction, equal participation with adults, exploration of diverse identities, and elaboration of possible futures; (c) improve youth’s ability to understand and contribute to (trans)forming their life contexts, exercising skills for protagonism and positive intervention (Mouchrek, 2017).

Universities have also an important role in the process of transition towards sustainability, offering experiences for students to develop skills of integration, synthesis, systems-thinking, complex problem solving, and awareness of social responsibilities associated with professional practice, self-efficacy, and capacity for advocacy and interdisciplinary collaboration (Sibbel, 2009; Stephens et al. 2008). The changes required in the process of social learning in the transition to sustainability will be performed via active participation of competent citizens (Barth et al., 2007). Awareness and competences in sustainability are increasingly necessary in the constitution of citizenship and social engagement.

Key competences for sustainability to develop are as follows: foresighted thinking; interdisciplinary work; cosmopolitan perception, transcultural understanding; participatory skills; planning and implementation; empathy, compassion and solidarity; self-motivation and motivating others; distanced reflection on individual and cultural models (Barth et al. 2007). Design Labs for Sustainability are aligned with those objectives, fostering students to learn, constitute competences and engage in sustainability. This is particularly important in design education, considering the role of designers in facilitate change towards sustainable lifestyles and practices.

2.5 Living Labs for Design and Sustainability

Considering Living Labs for Design and Sustainability in educational contexts, some relevant initiatives can be pointed out:
• MIT Sustainable Living Lab\(^{209}\) (USA). It is committed to transforming the campus into a living laboratory for sustainability innovation - a place where students, faculty, and staff work together to problem-solve through applied research and analysis.

• Cambridge Living Laboratory for Sustainability \(^{210}\) (UK). The ‘Living Lab’ provides opportunities for Cambridge students to improve environmental sustainability on the University estate through projects, internships and research. It draws on the expertise and talent of students and staff at the University of Cambridge, encourages application of knowledge to the real-world context, enhances skills of those involved, and increases connections between people.

• Sustainable Summer School Designwalks\(^{211}\) (Wuppertal Institute, Germany). The concept of Living Labs was the base for this project. In workshops, courses or seminars taking place at an innovation campus, students and professionals from general design and product design courses will create innovative and resource efficient Product Service Systems in an inter and trans-disciplinary fashion.

• POLIMI DESIS Lab (Italy)\(^{212}\) - The POLIMI-DESIS Lab, based in the Department of Design of Politecnico di Milano, is composed of a group of researchers adopting a strategic and systemic approach to design, with a specific focus on design for services and design activism. It has a background in service and product-service-system design for sustainability and investigates the way design can support and trigger social innovation, combining creativity and visioning with the capability of engaging in co-design processes.

These initiatives illustrate the potential of universities and schools become living labs for sustainability worldwide and opening space for experimentation and communication for young people and community.

3 Procedures and Methods: Applied Approach of Co-creation in Design

The initiative presented is part of the project Design and Transformation, developed by the authors at the State University of Minas Gerais (Brazil) and the Human Centered Design program at Virginia Tech (United States). The project aimed at investigating the potential and applicability of design as an agent of change in the process of transition to sustainability, regarding students in the transition to adulthood.

Following a general trend of change of perspective in the field, we can currently find various types, paths and design research activities (Buchanan, 2001). In addition to the traditional methods, design research has been using increasingly new methods developed specifically from the thought and practice of design, many of them still in progress (Pizzocaro, 2011). In this context, we highlight the potential of design research to: (a) start research on issues not yet raised (Friedman, 2000); (b) enrich the skills of designer/student/researcher in design to produce a larger understanding and a conscious knowledge facing the issues that present themselves today (Pizzocaro, 2011).

The research methodology is aligned with Participatory Action Research, as it aims to include and empower the object of study (students) and configure participants as agents with voice, resources, and authorship (Brandt et al., 2013; Wright & McCarthy, 2015). The research will also adopt the concept of Design Space: a space for emerging potentials, which is built and co-designed by multiple actors in their interactions, integrating diverse tools, technologies, materials, processes and social arrangements.

\(^{209}\) https://sustainability.mit.edu/living-lab

\(^{210}\) http://www.environment.admin.cam.ac.uk/living-lab

\(^{211}\) http://wupperinst.org/en/p/wi/p/s/pd/290/

\(^{212}\) http://www desi snetwork.org/courses/polimi-italy/
The nature of the present research is qualitative and multi-method, using a composite of procedures and tools. The methodology involved exploratory survey; analysis and understanding of context using design principles and practices; and proposal and implementation of innovative interaction strategies, based on processes of co-creation in design.

At the core of the participatory design approach, there is a range of activities of co-creation in design. The term co-creation came to describe a process that "involves the creativity of designers and people not trained in design, working together in the development process" (Sanders & Stappers, 2008, p. 1), allowing the participation of various actors in key decisions. Co-creation/codesign is a way of progressing through a problem or design scenario and is used as a means of, for example, attending to behavioural change (Kingsley, 2009). Bringing co-creation into design practice changes “how we design, what we design, and who designs. It will also affect the tools and methods that the new teams of co-designers will use.” (Sanders & Stappers, 2008, p. 12). Typical features of participatory design are the collective construction of knowledge, mutual learning, prototyping, iteration.

In conducting processes of co-creation, roles change and become more complex: the user/audience becomes co-designer of the process, the designers/researchers are also facilitators and designers take on new tasks, demanding new skills and competencies (Sanders & Stappers, 2008). Therefore, it is important to develop skills and provide opportunities for experimentation in co-creation approaches in design education. The initiative presented in the following item is oriented to these purposes.

3.1 Laboratory of Design, Co-creation, and Sustainability

Design schools have an important role in promoting innovation in society. Teaching and research activities can be oriented to approach societal problems and develop solutions that are suitable for specific contexts. In this sense, ‘living laboratories’ (living labs) offer significant opportunities to investigate everyday practice and collaborative explore possibilities of making, by opening a space of encounter between researchers and users.

The Laboratory of Design, Co-creation and Sustainability (Figure 2) was developed as an undergraduate course for Design students, elaborated and conducted by the authors at the State University of Minas Gerais (Brazil) in 2013-2014 (Mouchrek, 2014). It was conceived as a Design School Lab, defined as “a team of researchers, teachers and students who orient their didactic and research activities towards promoting sustainable changes” (Manzini, 2011), aiming to constitute a formative design research environment (Binder et al., 2011).

The primary objective of the Laboratory was promoting experimentation of strategies of co-creation and sustainability tools, teaching students to identify and apply different possibilities to develop a design project. Following an experimental approach, the course aimed to extend the capability of active intervention of future designers in contexts of transition towards sustainability, encouraging
them to interact collaboratively to develop, facilitate and implement innovative solutions in this field.

The students were asked to develop an open project, in three phases: 1. Research; 2. Analysis; 3. Project development (Synthesis and Concretization). The steps in the design process are shown in Figure 3. The design focus was defined as promoting the culture of sustainability targeting young audience from 14 to 24 years old. The targeted audience could be either the students from a technical secondary school in design and visual arts or the students from their own university (undergraduate school in design). Since the design students were in the same age group (18-24 years old), in several cases they were at the same time users and designers of the proposed solutions. The evaluation criteria adopted in this course were qualitative and process-based, considering the result of the project, but also the whole development process and the possible innovation impact of the solutions. In this way, students were encouraged to register and document all phases of the process with pictures, images, graphics and comments. While on phase 1 (Research), the instructors used a more directive approach, including lectures and guided participatory activities, during phases 2 (Analysis) and 3 (Project), the instructors focused on guidance and monitoring.

![Figure 3 - Phases of the design process in the Laboratory of Design, Co-creation and Sustainability: Research, Analysis, Synthesis, and Concretization.](image)

The student groups had relative autonomy to decide what and how to do at every step of the way, bringing the issues and question to the teachers who offered references, proposed some discussion points, pointed out possible options and analysing consequences of their choices. Students have learned from real situations, seeking means of understanding and solving as issues arose. The main idea was providing an open space for students to actively participate since the beginning of the project, allowing them to define: what did they want to design (products, services, interfaces or communication strategies), why did they want to do that and which innovation impact they meant to achieve. They also were invited to bring their own references and bibliography, which resulted in a rich collective of shared resources.
3.1.1  Phase 1 – Research: Initial Surveys and theoretical basis (conceptual phase)

The purposes of the initial phase were: (a) opening the debate and introducing the themes to be explored in the course; (b) broadening and deepening design concepts; and (c) building a collaborative approach that would guide the subsequent phases. It consisted of ideation sessions and construction of collective visual maps about:

- Design conceptions, potentialities and limits
- Characterization of the target audience (What means to young nowadays? What is the spirit of our time? What questions emerge? How design can speak to them?)

The collective maps drawn up at the beginning of the process led to the emergence of various issues and fuelled an active debate among the students, who have shown interest, willingness to express their views and collaboratively built a complex profile of issues related to young people’s reality. Figure 4 shows the students working together to build the conceptual and visual maps.

The first phase also included lectures and discussions about contemporary visions of design, sustainability approaches in design projects, approaches and tools of design research, case studies on systemic and strategic approaches in design and open innovation.

3.1.2  Phase 2 - Analysis

From the topics covered in the collaborative maps and analyses, students organized into groups and chose themes for elaborating their project. The themes for the projects sought to answer the questions "What are the perceived problems or opportunities?" and “How these questions are related to the dimensions of sustainability?”, starting with intense ideation sessions. The sequence of actions in the research phase followed the outline presented in Figure 5.

![Research Outline]

| Define: | 1) Idea / initial research proposition |
|         | 2) Challenges and opportunities |
|         | 3) Research strategies and methods to use in the first phase of the project (e.g. interviews, field study, observation, document analysis, etc) |
|         | 4) Research question |

| Report | All design project definitions so far (e.g. place, audience, user groups, etc). |
With defined focus and context, the following four weeks were designated to research and analysis on the chosen topic, including to outline a script, to plan and to realize a field research with the participation of the target audience, and finally to present the results of the initial phase of project. By presenting the synthesis of their in-progress project, students completed an important milestone in the Design Lab. The in-progress project presentation requires students to exercise skills such as: synthesis, visualization, project planning and management, organization, systemic view. It is also a great opportunity for students to receive feedback from the instructors and from peers – and eventually reframe, reorient or even pivot their project. The presentations are structured according to a template (Figure 6).

3.1.3 Phase 3 – Project (synthesis and concretization)

After the in-progress presentation and the collective debate about the project and the progress of the work of each group, the students began the implementation phase. During the final four weeks to develop their projects, which should rely on some type of application, even a high-fidelity prototype and a preliminary test. As a final result, the groups made 15-minute presentations (Figure 7), in which they described the phases of the process, the product/pilot intervention developed and analysed the process as a whole. The presentations followed the script show in Figure 7.
common issues among young people in particular contexts. In both kinds of solutions, the central role of communication strategies was observed. All projects aimed to generate common good, with real social impact for the concerned communities. A synthesis of projects developed by the students is presented in Figure 8.
Figure 8 – Synthesis of projects developed in the Laboratory of Design, Co-creation and Sustainability.

During the whole process, several competences were involved and stimulated. Design tools such as visual mapping, collaborative maps, ideation sessions, desktop research, visualization techniques,
questionnaires and surveys, virtual prototyping and immersion with user participation were applied. These tools and schemes for structuring, synthesis and presentation of project aimed to direct the concept definition and the development of the project, assuring consistency while maintaining the flexibility and room for innovation.

4 An open discussion

The Laboratory of Design, Co-creation and Sustainability promoted interesting results and proved to be a promising initiative toward the purposes of this research, insofar as it resulted in the production of concrete collective results, from the joint dynamics of diverse expertise and perspectives. The open approach led to the development of competencies as context analysis, proposal of foci for intervention, research and selection of information and forms of intervention, knowledge and selection of design tools, synthesis, visualization, familiarity with development and design stages and ability of organization and communication.

Some important aspects can be highlighted in relation to dynamics proposed by students, which include:

- active use of social networks and platforms as a tool for communication and interaction in an innovative way;
- the use of alternative references in search of content (e.g. videos, movies, other initiatives);
- the perception of the concept of sustainability related to the context in which young people live today and their interests;
- the intention to promote democratic processes for young people to express their aspirations and transform them into action with the support of design tools and methods.

Furthermore, in the context of the initiatives motivated and driven by design, we could notice that the participatory approaches, based on co-creation, offer excellent opportunities to promote the sustainability culture among young people (especially young design students), because they contribute to (Mouchrek, 2014):

- develop capacity of critical thinking and ability for analysing complex problems and find differentiated solutions;
- provide fields of experimentation in which the young person explores the possibility of creating solutions from their own resources and motivations of action;
- offer a range of tools and forms of intervention, that young people learn collaboratively to select and apply;
- create possibilities of developing concrete projects and geared to action;
- establish a dynamic system, where the impact of actions generates a mechanism of feedback and confirmation coming from their community of reference, which nourishes and stimulates new cycles of project and applied action.

Regarding the students’ collective construction of knowledge during the Laboratory of Design, Co-creation and Sustainability, the visual maps and discussion in the initial phase led to particularly deep reflection and rich results. The diagram in figure 9 shows all the aspects raised by the group in response to the questions: “What is being young nowadays? What is the spirit of this time?”. Students showed a profound understanding of the complex challenges and characteristics of contemporary youth cultures, in which they are embedded themselves. Additionally, when asked how the field of design can contribute to solve these issues, students came up with innovative strategies and potential leads for design projects, which inspired their exploration and project development throughout the Design Lab experience.
Figure 4 - Collective concept map - Laboratory of Design, Co-creation and Sustainability. Source: Mouchrek (2014).
The Lab was conceived and performed as an open experience, displaying the main features of co-design activities: aiming to fostering systems thinking; encouraging students to be active participants and suppliers of sustainable solutions (Fuad-Luke, 2010); allowing the emergence of new ways and possibilities of action; and promoting partnerships and collaborative construction of knowledge. Promoting self-reflection and the students’ ability to design as a “reflexive dialogue” with reality (Schön, 1983) were also important aspects of this learning experience.

The experience also showed the potential of Living Labs for generating open and creative communication. Communication strategies in this field must, first and foremost, provide opportunities to hear what young people have to say. In a dynamic and open communication approach, it is possible to create contexts to transform perceptions, views, demands and desires of young people in practical factors of mobilization and expression. The communication created ‘by the young’ ‘for the young’ is a highly creative factor, given the impact that can generate in terms of stimulus, participation and representativeness.

The democratic and experiential forms of knowledge promoted by participatory practices are especially important for design research and education and have been investigating by many authors. The challenge of promoting the “learning by doing” is stressed by Penati (2012, p.57): “the didactic experiences aimed at the acquisition of design skills, or the transmission of capacities to operate heuristically, design exercises occupy a lot of space”. This consideration reinforces the nature of design as an open discipline. Quoting Penati (ibid.) it “is perhaps destined to keep open the areas of research that regard its practices and, among these, the practice of teaching”. Many designers and researchers have appointed the need of open practices of teaching and researching design, especially strongly in the last decade.

5 Final considerations
Several considerations raised in the theoretical framework have been confirmed in practice and new insights emerged. The results emphasize that the training of young professionals in design should include the development of competencies in sustainability, encouraging critical thinking and ability to implement innovative solutions.

About sustainability approaches, the findings suggest that: the issues related to sustainability that arouse interest and motivate actions are those linked to youth’s current reality; they respond positively when encounter contexts that facilitate the organization of ideas and resources and the conduction of project processes, allowing them to drive their aspirations and views towards the practical implementation. It is observed that a renewal of the discourse on sustainability has a very positive effect regarding the interest and impact of sustainable initiatives among young students.

The results also highlight the potential of co-creation in creating “contexts for change” and fostering sustainability culture, especially in design education. We highlight some important aspects raised in ‘open spaces’ teaching as developed in the

- Creation of contexts of action and interaction between young people;
- Develop and apply strategies of mediation to facilitate the understanding of the complex issues (as sustainability) and the search for solutions by the young people themselves;
- Foster innovative communication approaches, creating conditions for young people to create a speech from themselves.
- Learning to conduct research and develop projects (in addition to develop technical skills and capacity for analysis and application) promote autonomy and empowerment among students.

In this sense, the need of more open and flexible educational approaches is noted, in order to give more space for:
• common sharing – stimulating the participation of the students by including their contributions and own references (e.g. in the Course content definition);
• engagement – promoting the active involvement of users and stakeholders in the creative process;
• self-reflection – encouraging learning from experiencing and adopting the changes that the project may undergo during its own development as part of the process (learn from mistakes);
• flexible assessment – implementing alternative evaluation parameters for the results in terms of theoretical and practical learning.

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